Goddard Space Flight Center

Annual Operating Agreement for Fiscal Year 2000

Safety and Mission Assurance Functions

October 1, 1999

FY 00 Annual Operating Agreement for Safety and Mission Assurance Functions Goddard Space Flight Center/ NASA Headquarters

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1.0 INTRODUCTION

1.1 The Annual Operating Agreement

This Annual Operating Agreement (AOA) describes the safety and mission assurance (S&MA) activities performed at the NASA Goddard Space Flight Center (GSFC). The plan documents the activities, methodologies, and resources required to meet the needs of customers, in the areas of S&MA. The S&MA related activities at the GSFC are performed by four GSFC organizations as follows:

1. Institutional safety at Greenbelt is supported by Code 205, the Safety, Environmental, and Security Office plans, develops, and manages policy and procedures for protection of personnel, property, and the public from hazards generated by processes and operations at GSFC, as well as managing the GSFC Emergency Management Program;
2. Systems S&MA is supported by Code 300, the Office of Systems S&MA (OSSMA) plans, develops, and manages policy and procedures for the systems safety of mission related assets and property as well as mission assurance for all GSFC implemented and managed activities. Code 300 also manages Center wide mission related processes and provides an independent assessment function for the Center Director;
3. Safety and certification of pressure vessels and lifting devices is supported by Code 540, the Mechanical Systems Center; that has the responsibility for the establishment of policy, requirements, and the implementation of a safety and certification program for lifting devices and equipment, ground-based pressure vessels and pressurized systems;
4. Institutional safety, range safety, aircraft safety and mission assurance at Wallops is supported by offices within Code 800, Sub-orbital Projects and Operations Directorate. These offices develop, and provide functional management of policies and procedures for ground and flight safety, aircraft safety, range safety and mission assurance for Wallops mission related activities.

This agreement provides details on the implementation of these activities that support the implementation of the GSFC Strategic Implementation Plan. It also reflects linkage to the objectives of NASA Code Q, and the NASA Enterprises, Space Science (Code S), and Earth Science (Code Y). It was prepared in response to the NASA Headquarters requirement for an annual operating plan that addresses the elements of the NASA Code Q Integrated SMA Management Model.

1.2 AOA Purpose

This plan will be used to manage the S&MA related activities in FY 00. The expected benefits of the AOA process are; better identification of customer requirements, increased focus of the organization on common goals, and greater definition of the support office responsibilities. It is further expected that there will be improvements in customer satisfaction as features described in the AOA plan are implemented.

This agreement is designed to be a top-level working document. It was developed through assessment of internal operations, describing processes and metrics that enable optimization of performance, and self-evaluation as an integral part of the management process.

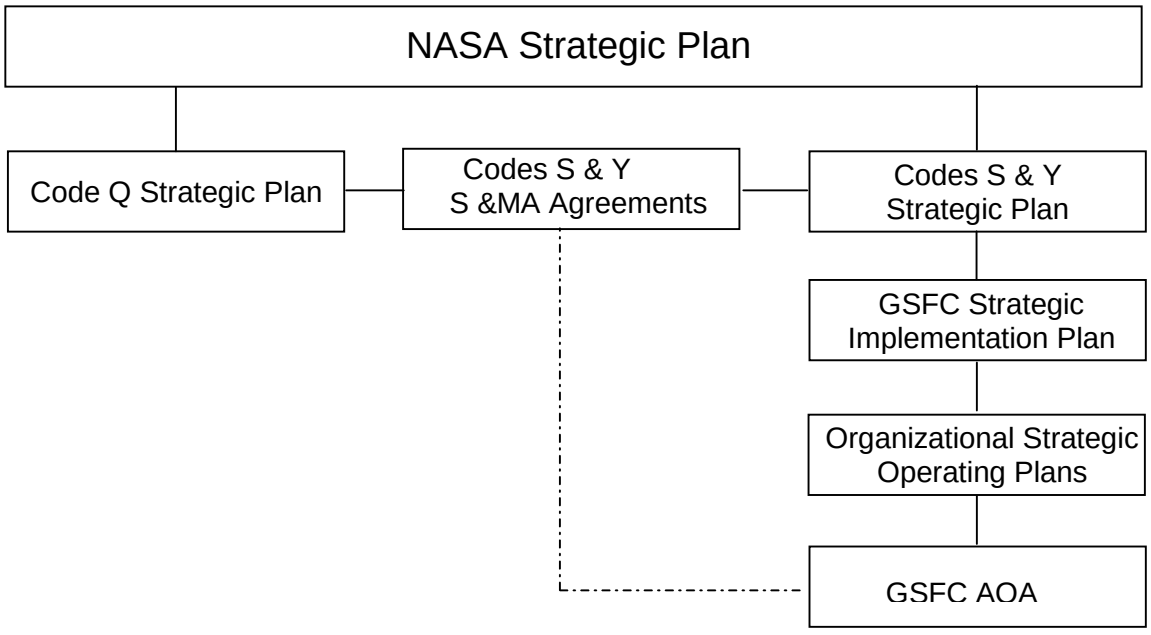
1.3 S&MA Methods / Approach to Implementation

The S&MA activity is undergoing a multi-year transformation and development effort that builds upon results, procedural development, and organizational growth. The GSFC S&MA support offices are continually identifying changes in processes, adding new processes, aligning activities within the GSFC framework, and implementing strategies that will lead to improved implementation of the NASA Strategic Plan.

A Center wide thrust is being made by all organizations at the GSFC to implement the Center Director's number priority, the Goddard Safety Initiative. The Goddard Safety Initiative is led by the Center Director and the Goddard Executive Council and captures the idea that responsibility for safety rests with the Goddard supervisors, managers and workforce. Additionally, in response to Code Q S&MA Agreements with Codes Y and S, this AOA reflects new approaches in customer service methodology. As S&MA implementation evolves, it continues to move away from being rules driven and toward being responsive to each individual situation and circumstance. Customer needs are integral to the formation of S&MA support plans, and take into account parameters such as mission size, available resources, and acceptable risk levels. Support levels exist in a wide range in response to customer needs. The fundamental approach for S&MA operations at GSFC is to closely match mission needs with S&MA services, to define processes that effectively meet customer requirements, and to deliver services in an increasingly efficient manner.

1.4 Linkages to NASA Strategic Plan and GSFC Strategic Implementation Plan

The following diagram illustrates linkages between this document and the higher level strategic plans that it supports.

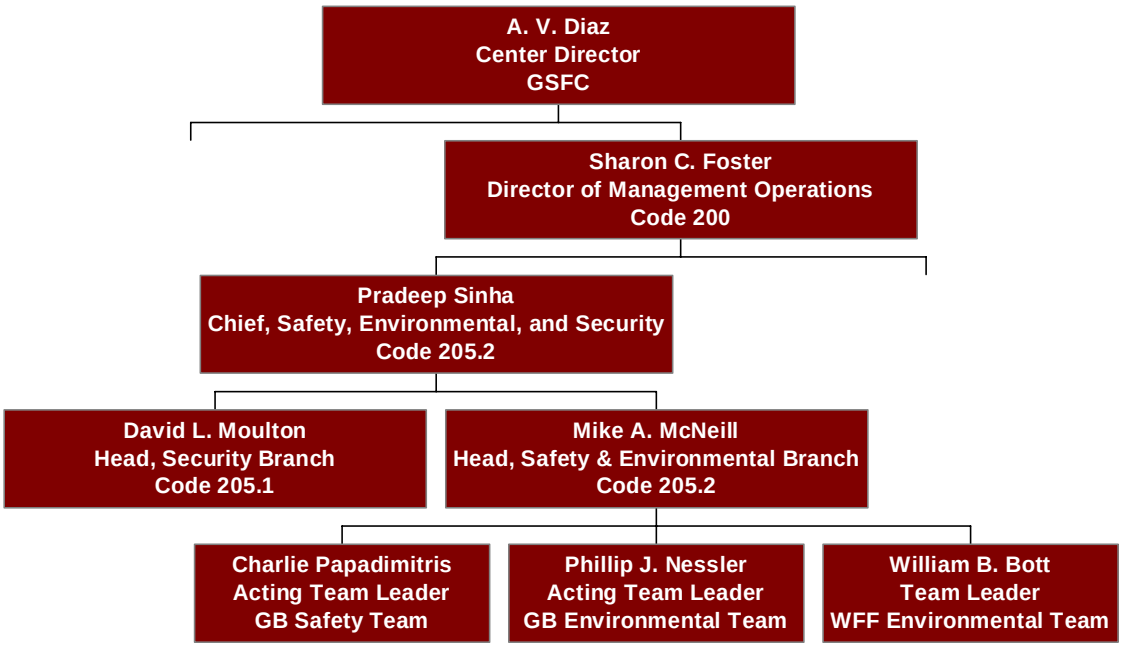


2.0 GSFC Safety, Environmental, and Security Office, Code 205

Institutional and occupational safety responsibilities at GSFC, Greenbelt are divided between two organizations, Code 205, the Safety, Environmental, and Security Office and Code 540, Mechanical Systems Center. Code 540 is responsible for lifting devices and non-flight pressure vessel safety programs, while Code 205 is responsible for the balance of the program.

The Safety, Environmental, and Security Office (Code 205)

The Safety, Environmental, and Security Office plans, develops, and provides functional management of policies and procedures for Safety, Environmental and Security issues at GSFC/Greenbelt. The Office establishes and approves precautions for protection of personnel property and the public from hazards generated by processes and operations at GSFC. The Office is also responsible for the GSFC Emergency Management Program, which includes preparation for and response to emergency incidents at GSFC.
The organization is structured as shown below to support the various functions.



The Safety and Environmental Branch (Code 205.2), plans, develops, and implements facility assurance programs and controls for the safety of personnel, protection of property and for the safe operations of facilities at GSFC/GB. It performs periodic reviews of research facilities, apparatus designs and operations to ensure compliance with established programs and regulations. Greenbelt's facilities consist of a wide range of fabrication shops, storage and processing facilities, materials testing apparatus, laboratory operations and office environments. The Safety and Environmental Branch provides safety and facility assurance support through the following work processes: Occupational Safety, Occupational Health, Facility System Safety, Radiation Safety, Chemical Safety, Fire Protection, and Emergency Preparedness programs. The work processes listed below are described in Appendix E -1.

Activity	Customer	Process Sheet
Occupational Safety	Center	E-1-2
Radiation Protection	Center, NRC, Community	E-1-3
Emergency Preparedness	Center, FEMA, Community	E-1-4
Facility System Safety	Center	E-1-5
Chemical Safety	Center, Community	E-1-6
Fire Protection	Center, PGFD	E-1-7
Occupational Health	Center	E-1-8

Safety and Environmental Branch Staffing

The total Safety and Environmental Branch staffing with regards to Safety programs is shown in the table below for civil servant support to the various programs. The data presents a snapshot of current staffing. Hiring actions are underway to fill the Safety Team Leader and vacant staff position. Program assignments are listed across the top of the matrix. Numbers on the side of the matrix represent buildings assigned to each staff member. This provides GSFC with a specific safety point of contact for each facility. Numbers with an "A" in front of them indicate an off-site area, which is comprised of several facilities. For example A200 indicates Area 200, Optical Test Site, which is comprised of 20 facilities/buildings.

The Safety and Environmental Branch also has a support services contract which provides contractor support in the areas of Occupational medicine, industrial hygiene, occupational safety, and environmental compliance. This contract is currently in transition due to contract change. Full staffing for the contract has not been determined.

3.0 Office of Systems Safety and Mission Assurance (Code 300)

3.1 Functional Role

The OSSMA implements the following three functions at the GSFC:

1. Does independent assessment and compliance certification for the Center Director and the Goddard Program Management Council (GPMC);
2. Manages certain processes related to mission implementation for the Center and;
3. Supports the safety and mission assurance function implementation for space flight and space flight support missions.

3.2 Organization

Organizationally the OSSMA currently consists of a Directorate level office and three Division level offices. It is expected the in the near future, that two of the three Divisions will undergo a transformation that will allow for a more efficient and complete implementation of the functions specified above. In this transformation a fourth Division level office will to be created. These transformations do not add substantially to the charter and work of the OSSMA, but are generally being done in recognition of the importance of proper process management. Although not yet fully implemented, this AOA describes the new transformed organization since most of the work in FY 00 is expected to be performed under this new organization.

3.2.1 OSSMA Directorate Office, Code 300

The OSSMA Directorate staff provides administrative management and support to the four OSSMA Offices. Information systems and resource management activities are included in this role. Certain S&MA and Center management related tasks are also performed directly by the OSSMA Directorate staff. These include the ISO 9001 registration and Anomaly review efforts.

The Director of the OSSMA functions as one of the three ISO Management Representatives for the Center. The OSSMA Associate Director is responsible for day to day management of the GSFC program that works to maintain the Centers ISO 9001 registration. In support of the ISO 9001 management process, the OSSMA manages the ISO compliant Quality Management System Internal Audit process. These regular self-assessments are done to measure quality system effectiveness and are a required element of ISO registration. Comprised of a coordinator and three lead auditors, the committee provides assessment, audit documentation, and verification of corrective action for ISO controlled processes. This activity is further described in GSFC document GPG-9980.1

Whenever major issues or anomalies within GSFC programs or projects develop, the Directorate institutes an Anomaly Review function. This provides for a coordinated approach to the analysis of information regarding operational and performance anomalies, and dissemination of resulting information across the Agency and into the planning of future missions.

Development and maintenance of S&MA related databases, providing support to GSFC projects, to other NASA Centers and other Government Agencies through on-line systems is also managed by the OSSMA. These databases are described below:

- **Non-Conformance Reporting/Corrective Action System**
  This system captures operational non-conformances of flight hardware, software, mission operations, ground stations, and NASA communications systems employed in orbiting spacecraft, for use in the prevention of future occurrences. This activity is referenced in GSFC ISO document GPG-5340.2, and is further described in GPG-1710.1.

- **SOARS - Satellite Orbiting Anomaly Reporting System**
  Provides a historical summary of orbital anomalies observed on GSFC spacecraft. This database has been linked to a similar system at Aerospace Corp. for increased value.

- **WAS - Work Authorization System**
  This is an internal system for work authorization and status tracking and serves the Center project management effort.

- **FARS - Flight Assurance Review System**
  Repository and tracking system for reviews conducted by the OSSMA Systems Review Office.

- **PROCON – Programmatic Concerns System**
  Used internally by the Systems Assurance Managers to document, update and track risk bearing programmatic elements.

Code 300 manages the Agency's Supplier Assurance Contract, (SAC), which is a new contract that supplements the existing Defense Contract Management Command. The SAC provides Safety and Mission Assurance oversight/insight of approximately 2700 prime and sub-tier contractors throughout the continental United States. This contract covers all safety, reliability, and quality assurance aspects of contract-directed activities for the NASA Centers.

3.2.2 Systems Management Office (SMO), Code 301

The Code 301 Division Office, currently called the Systems Review Office, will be renamed the System Management Office and will encompass five distinct functions. These functions are related in that they are all elements critical to the successful implementation of programs and projects at the Center and are subject to an independent assessment of their implementation. For most of these five functions, Code 301 is responsible for developing, managing and helping the implementation of the GSFC processes that control the functions, but the actual implementation of each function is the responsibility of the project organizations themselves. The following then describes these five process areas that are incorporated into Code 301 and the level of responsibility for each:

1. Requirements Management
   Code 301 is responsible for the development and maintenance of the process that the Center's programs and projects use to develop and manage their requirements. The actual implementation and management of requirements is solely the responsibility of the individual program and project. In conjunction with Code 304, Code 301 provides tutoring and guidance to help set up Requirements Management processes on individual GSFC programs and projects. Additionally, at various points in the implementation of the program or project, Code 301 audits, through its Systems Review Function, the actual individual program and project Requirements Management implementation. The Division then certifies to the Center Director and to the GPMC that each effort is in compliance with the Center's Requirement Management process.

2. Systems Engineering
   Code 301 is responsible for the development and maintenance of the process that the Center's programs and projects use to implement Systems Engineering. The actual implementation and management of Systems Engineering is the responsibility of the Systems Engineering Division in the Systems Technology and Advanced Concepts Directorate as well as the individual programs and projects. However, here again Code 301 provides tutoring and guidance to help set up an adequate Systems Engineering process on

individual GSFC programs and projects. Additionally, at various points in the implementation of the program or project, Code 301 audits, through its Systems Review Function, the actual individual program and project Systems Engineering implementation. The Division then certifies to the Center Director and to the GPMC that each effort is complying with the Center's Systems Engineering process.

3. Independent Cost Assessment
   Code 301 is responsible for providing authoritative, independent cost and manpower analyses in support of the Center Director and the GPMC. In order to maintain records of Center performance in cost and manpower utilization, the organization is responsible for establishing and maintaining appropriate databases, which include the collection, analyses and normalization of technical, programmatic, cost and manpower data for all GSFC flight projects. This organization develops cost and manpower models that reflect GSFC history as well as current trends in the aerospace industry. Independent cost analyses are performed for all new start projects and others in the formulation and execution phases. The independent analyses are provided to the Center Director, the New Business Committee and the GPMC as authoritative predictions of cost, manpower, and resources necessary to ensure mission success.

4. Risk Management
   Code 301 is responsible for the development and maintenance of the Risk Management process that is used to analyze and manage risk on GSFC programs and projects. The actual implementation of a risk management program is the responsibility of the program or project manager. Code 301 provides tutoring and guidance to help set up an adequate Risk Management process on individual GSFC programs and projects. Additionally, at various points in the implementation of the program or project, Code 301 audits, through its Systems Review Function, the actual individual program and project Risk Management implementation. The Division then certifies to the Center Director and to the GPMC that each effort is complying with the Center's Systems Engineering process.

5. System Review
   Code 301 is responsible for the development, maintenance and the implementation of the System Review process on Center. The System Review Process provides much of the independent assessment of programs and projects for the Center Director and the GPMC. They are tailored to each project, and complement detailed peer level technical reviews and are conducted to ensure the highest certainty of mission success. This process is undergoing a transformation that is aimed at making it more encompassing yet at the same time less duplicative and less burdensome on the individual programs and projects. The transformed process will rely on peer level reviews for the pendent assessment of technical aspects such as design, integration and test. The System (level) Reviews will then assess the implementation and performance of these peer level reviews as well as the resolution of technical issues that were identified in the peer level reviews. The System Reviews will also address, and independently assess, the implementation of the above four other processes as well as the implementation of systems safety, reliability and mission assurance on each program or project. Finally, at critical junctions such as GPMC reviews, Code 301 provides reports to the Center Director and the GPMC on the level of successful implementation of these six processes.

   For all GSFC programs and projects, a Systems Review plan is generated by the Program or Project Manager and is approved by the Systems Review Office in Code 301. The Systems Reviews themselves are managed by Code 301 but are implemented usually in

one of two ways. For smaller programs and projects, the Systems Review Office actually sets up and conducts these reviews with support from many of the other Directorates on Center. For some specific, more difficult programs or projects, the Systems Review Office sets up a Standing Review Committee that implements the Systems Review Process for that mission. In this situation a Standing Review Chairman is chosen to be a very experienced, senior level Center manager and Code 301 provides a review team executive secretary. This Standing Review Team acts for the duration of the implementation and operational program or project effort. It is put in place to not only review the implementation and operation, but to also act as a continuously available independent advisor to the program or project manager throughout the implementation and operational life cycle.

Through the performance of these five activities the Systems Management Office provides an independent assessment function for the Center Director, the Center's New Business Committee and the GPMC. As these assessments are done they are appropriately documented and published. As a final readiness document, Code 301 provides the Red Book that documents the level of accomplishment and subjectively quantifies the residual risk remaining in each GSFC program or project. The Red Book is provided to the Center Director prior to the GPMC conducted readiness review.

3.2.3 Systems Safety and Reliability Office, Code 302

The Systems Safety and Reliability Office (SS&RO), Code 302 is responsible for supporting the implementation of systems safety and reliability over the entire program life cycle for all GSFC, Greenbelt, space flight and space flight support missions. Code 302 works to policy guidelines set by NASA Headquarters and the Center and to safety implementation requirements set by the Agency, OSHA, the STS and ISS Program Offices and the various launch ranges. As support team members to the Projects, the Code 302 personnel provide expertise and other resources to fulfill Program, Center and Enterprise mission objectives. Expert technical support is provided in the areas of systems safety and reliability. Code 302 maintains an expertise in interpreting safety requirements imposed by government regulation, Agency policy, OSHA, and the launch ranges. This expertise is provided to Code 302 customers for the achievement of full safety compliance in all mission aspects. Depending on the specific needs of a customer, SS&RO involvement ranges from the provision of basic guidance, to the actual generation of safety documentation. They also provide the necessary certification of compliance with safety requirements for all GSFC space flight and space-flight support missions as required by the Center Director and the Director of OSMA at NASA Headquarters. The SS&RO has developed a series of support levels to use for the varying mission types, from full safety implementation for the mission to only minimal insight for the Project Manager. With full implementation, the SS&RO safety personnel actually accomplish the work for the project, that is, evaluating and documenting the design, determining the hazards, controls and verifications and preparing the safety data packages that are presented to the appropriate launch range safety organizations. The levels of support are negotiated with the Project Manager at the beginning of the project and reviewed during the mission to increase or change the support needed as the mission progresses.

The SS&RO also supports missions in the implementation of reliability programs. The SS&RO has developed a series of reliability programs that can be implemented on behalf of the mission. The maximum support provided encompasses a complete design evaluation, design trade off analysis, reliability block diagrams, reliability predictions, derating analysis, worst case analysis, limited life predictions, and other services. The office and missions can select many of the

services above to perform parts of the reliability program to enhance the chance of mission success while minimizing costs to the missions for the support. Also under the auspices of the reliability engineering support is the environmental test policy activity. The SS&RO provides expertise in the areas of vibration, acoustics, thermal, electro-magnetics, magnetics, and radio frequency testing to support the flight missions. The support allows the mission personnel to develop and implement effective and efficient test programs tailored to the needs of the mission and the mission environment.

3.2.4 Assurance Management Office, Code 303

The Assurance Management Office (AMO) is responsible for supporting the implementation of mission assurance over the entire program life cycle for all GSFC, Greenbelt, space flight and space flight support missions. Code 303 works to policy guidelines set by NASA Headquarters, Code Q, for the implementation of mission assurance and to programmatic guidelines set by the NASA Enterprises and the Center Director. As support team members to the Projects, the Code 303 personnel provide expertise and other resources to fulfill Program, Center and Enterprise mission objectives.

The Assurance Management Office provides expertise to the GSFC space flight and space flight support programs in the implementation of mission assurance. This expertise is managed through a single point of contact, the Systems Assurance Manager (SAM) who functions as a member of the project management team. This method of customer interface helps the project manager to establish, coordinate, and manage the implementation of both the assurance program and the system safety program. Generally the SAM is co-located with the project office, to provide the most efficient access to the project manager and his staff. The AMO also provides additional resources in the form of Quality Engineers and Quality Assurance Specialists under the purview of the SAM. The SAM works with the project to provide additional resources for acquiring and managing other elements such as materials and parts support, process verification, reliability, safety, quality and software assurance, environmental test verification, and the performance of technical system design reviews.

At the beginning of a new project, the SAM assists in the establishment of a Systems S&MA Plan (SSMAP). This plan is developed from general OSSMA Mission Assurance Guidelines (see GSFC ISO 300-PG-7120.2.1 and 300-PG-7120.2.2), which are tailored to specific project needs and programmatic requirements. The team-produced SSMAP reflects specific project requirements, such as hardware criticality and characteristics, mission objectives, and acceptable levels of risk, as well as Agency, Enterprise, Center, and Government policy and regulations. The plan covers system safety implementation, all aspects of mission assurance, and the Technical Design Review Plan. The Director of OSSMA approves the SSMAP in the initial stages of each project.

The SAM then actively participates in all phases of the developing program. Throughout the concept formulation, RFP preparation, and Source Evaluation Board activities, the SAM works as a key member of the mission team in the development of project S&MA requirements and participates in the proposal evaluation process. Following contract award, the SAM is a key senior member of the project manager's team and is responsible to both the project manager and the Director of OSSMA to assure that all S&MA requirements, as specified in the project SSMAP, are properly implemented.

The SAM develops civil service manpower requirements for all OSSMA support personnel. As an interface between the Project Manager and the GSFC Directorates, the SAM aids in the acquisition of OSSMA support contractor resources.

The SAM is responsible for the quality assurance program, and delegates, with the project manager's concurrence, quality assurance functions to supporting Government Agencies such as the DCMC, NAVPRO, ONR, or the Supplier Assurance Contract (SAC). The delegations cite well-defined assurance requirements tailored to the individual project requirements. (Appendix B of this AOA provides details of the planned GSFC Quality Assurance delegated support for FY99 and FY00) When appropriate, the SAM recommends to the project manager the establishment of field office operations at contractors' plants, in order to provide the necessary insight/oversight support to the project. Located at selected NASA contractors, SAC is expected to provide faster response at a lower cost in the support of quality assurance programs. Code 300 will be managing this contract in behalf of the participating NASA centers.

The occurrence of certain anomalies or any type of failure prompts the SAM to begin the process of problem management and resolution. Coordinating with contractors, suppliers, and other project personnel, the SAM collects pertinent information to determine the extent of the problem. The SAM then supports the project by identifying the actions necessary to correct and preclude reoccurrence of the problem. This may include guidance in the areas of design, manufacturing, testing, or documentation.

To record failure details, status, and corrective action taken, the SAM establishes a system for tracking and reporting failure occurrences. Status of active issues is provided on a monthly basis for risk assessment and management.
The SAM serves as the primary project interface with the Systems Review Office, within the Code 301 Systems Management Office, and works to assure that the implementation of the project systems review program is in compliance with the approved Systems Review Plan. Representing the project, the SAM will be the primary source of technical information to the Systems Review Office on S&MA issues concerning the use of specific parts, materials and processes, packaging, and the characterization of radiation effects. The reporting responsibilities of the SAM are described in ISO document 303-PG-1060.1.1.

The SAM has overall responsibility for ensuring that the generation and implementation of the project system safety requirements is in accordance with applicable NASA/GSFC, launch site, and project requirements and regulations.

3.2.5 Software Assurance Technology Office (SATO), Code 304

The Software Assurance Technology Office (SATO) is a new Division level office within the Office of Systems Safety and Mission Assurance (OSSMA). This office will support the activities of the other codes within OSSMA as they relate to software. Code 304 will be responsible for the tools and specific expertise to assess software assurance, i.e., support of quality assurance, software safety, and reliability for software products developed by the Goddard Space Flight Center (GSFC). Code 304 is responsible for developing, managing and assisting in the implementation of innovative procedures in these areas. Responsibility for the actual development, deployment and maintenance of software products, however, will remain with other GSFC organizations.

The following describes the four process areas that are incorporated into Code 304 and the level of responsibility for each:

1. Software Assurance Activities

   Software assurance responsibilities encompass analysis of the software products through metrics, reliability, safety and IV&V.

   1.a Software Metrics analysis - Code 304 is responsible for assisting the Code 303 SAMs and their projects in the implementation and interpretation of software metrics at all stages of software development life cycle as described below:

   - *Software Requirement analysis*: Support Code 301 with tutorials, guidance and metrics to evaluate the quality of requirements specifications in order to maximize test effectiveness.
   -
   - *Software Code analysis*: Directly support the Code 303 SAMs and the projects in numerical analysis of software to evaluate quality, maintainability, and reusability of code. There will be an emphasis on object oriented design and implementation as well as assistance in evaluating projects that are predicated on code reuse, reengineered code or COTS products.
   -
   - *Problem Report (Error trending) analysis*: Assist the Code 303 SAMs and the projects in identifying appropriate termination of testing programs based on required reliability levels and defect densities.

   1.b Software Reliability - Code 304 is responsible for assisting the Code 303 SAMs and the projects in the evaluation of reliability starting at the requirements phase and continuing through testing. SATO will actively promote the use of software metrics for reliability evaluation throughout the entire software life cycle.

   1.c Software Safety - Code 304 provides support to the projects in the identification of safety critical code modules, and recommending appropriate actions through the Code 302 Project Safety Manager.

   1.d Software Independent Verification and Validation (IV&V) - Code 304 is responsible for assisting in the development of IV&V policies and guidelines for GSFC in conjunction with the NASA IV&V Facility. Code 304 will also work with projects to identify a project's appropriate level of IV&V and areas where the IV&V Facility can assist projects in assessments, etc.

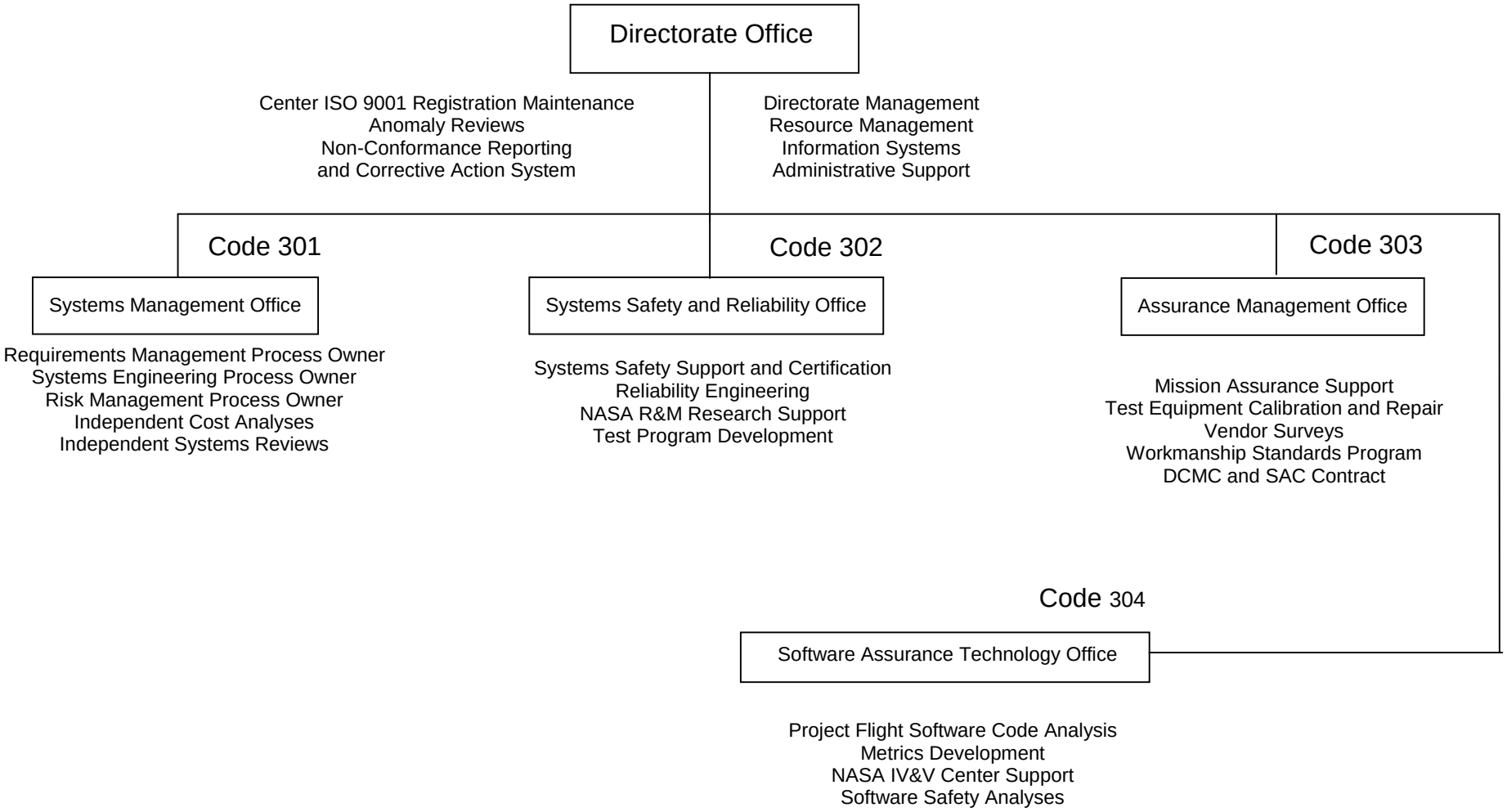
2. Research and Develop Applications of SQA Techniques and Tools
   Since software development techniques and approaches are constantly evolving, it is critical to NASA's success that new SQA approaches, techniques and tools be continuously evaluated so as to keep pace with current software development practices. Code 304 is responsible for identifying new techniques that have the potential to impact SQA activities, and for devising appropriate tools and techniques to support NASA's SQA efforts. This includes the efficient design of databases to support quality and to facilitate data retrieval and analysis.

3. Independent Support
   Code 304 is responsible for supporting offices and projects through the SAMs within GSFC, and throughout NASA, with the above activities when requested. Code 304 will also work with other GSFC and NASA entities, such as "Friends of Information Technology" to further SQA.

4. Technology Transfer
   Since much of the work of Code 304 incorporates leading edge technology in SQA and software development, Code 304 is also responsible for promoting these new technologies and tools throughout NASA and into industry at both the national and international levels.

CODE 304 will be supported by two entities: the Software Assurance Technology Center (SATC) and a Liaison with the NASA IV&V Facility. The SATC personnel will be supplied by the GSFC QA contractor to support the activities described above. The IV&V liaison will be supplied by the IV&V Facility and stationed at GSFC in Code 304 and will work with Code 304 and the SATC to actively promote software assurance and IV&V activities.

OSSMA Functional Organization Chart



3.3 OSSMA Goals

- Provide a complete set of S&MA related products and services to project and Center customers.
- Provide the best possible S&MA expertise to all customers.
- Assure that the appropriate level of S&MA implementation is planned from the start into each new program.
- Maintain a value-added S&MA involvement during all phases of GSFC programs.
- Provide an independent assessment role for the Center Director in order to maximize the probability of success for Center missions.
- Provide leadership in S&MA technology and policy development for the Center and the Agency.

3.4 OSSMA Strategies

- Work as team members with projects to develop optimum project specific system S&MA programs.
- Through metrics and self-evaluation continually adjust OSSMA methodologies to provide value-added support to the projects, the Center and the Agency.
- Implement a proactive approach to S&MA implementation.

3.5 CODE Q Funded Programs

The OSSMA manages tasks funded by NASA Code Q, that are designed to further the ability to provide better products and services in support of space-flight research and technology usage activities. These efforts are initially proposed by Offices within the OSSMA, based on understanding of mission goals and requirements. Code Q reviews these proposals and selects the ones that will provide the most benefit to existing and expected customer groups.

Submissions selected for funding by Code Q are developed and managed within the OSSMA. A financial spending plan is developed for each five digit UPN 323-XX program area for the duration of the program. The OSSMA Resources Management Office tracks expenditures versus plan. A quarterly presentation of status of each program is made to the Director of OSSMA, providing an opportunity to redirect resources within UPN programs, based on issues related to resource requirements, funding, or technical considerations. Significant project redirection, affecting scope of activity, is brought to the attention of NASA HQ for concurrence, if required. Results from completed programs are disseminated to users, sponsors, NASA HQ, and other centers, as applicable. A matrix of current UPN-323 tasks describing task objectives, funding profiles, responsible GSFC organizations, and task owners is in Appendix D.

3.6 OSSMA Staffing

The total OSSMA staffing is shown in the following table, as civil service and contractor support to the various Offices. The data presents a snapshot of current staffing by discipline. This summary differs from Appendix C in that only Code 300 personnel are included below, while Appendix C includes personnel support from other GSFC Directorates, relative to specific projects.

Code 300 Staff Resource Analysis

(Includes 2.5 FTE planned increase to Code 304)

Category	**Total**		**Code 300**		**Code 301**		**Code 302**		**Code 303**		**Code 304**	
	Civil Service / Contractor		c.s./cont.		c.s./cont.		c.s./cont.		c.s./cont.		c.s./cont.	
Management	9	9	3	6	2		1	1	2	1	1	1
Clerical	4.5	11.5	2	8	1			1	1	2	.5	.5
Facility Operations		2		2								
Software Engineer	1	34		12		2				12	1	8
Software Technician		1		1								
Metrology Engineer	1	1	1							1		
Metrology Technician		8.3								8.3		
Quality Engineer	2	28.5		1					1	28.5		
Quality Technician	2	5							2	5		
Safety Engineer	10	19					10	19				
Safety Technician		1						1				
Environmental Test Engineer	1						1					
Reliability Engineer	2	6					2	6				
Workmanship Trainer		7						1		6		
Review Managers	4				4							
System Assurance Managers	20								20			
Resource Manager												
Admin./ RA's	3		3									
Technical Management	2		2									
Mechanical Inspectors		4.9								4.9		
(Subtotals)												
CIVIL SERVANT	**61.5**		11		7		14		26		2.5	
CONTRACTOR		**138.2**		30		2		29		68.7		9.5
TOTAL	**199.7**											

The OSSMA supports the GSFC projects depending upon needs at various project phases. Appendix C displays OSSMA support to projects where resources are available and have been allocated. Based on projected requirements, additional staff is required as displayed in the following table. These needs are the result of increased project support demand, a higher level of Code 300 support across the Center, Code 300 initiatives to enhance internal operations, and vacancies created by staff turnover.

Current Code 300 Staff Shortfall

Category	Office	FTE's	Approved
Systems Review Manager	301	3	1 of 3
Safety Engineer1	302	1	1
Quality Engineers	303	2	1 of 2
Systems Assurance Managers	303	2	1 of 2
Product Assurance Engineers	303	2	1 of 2
Resource Analyst	300	1	1

4.0 Code 540 GSFC Mechanical Systems Center

The Code 540 Mechanical Systems Center Recertification Program (RECERT) Manager is responsible for establishing and implementing a Center-wide safety program for lifting devices and equipment (LDE), and ground-based pressure vessels and pressurized systems (PV/S) to comply with OSHA and NASA safety requirements. This Program improves safety, and minimizes potential damage to, and/or loss of, hardware and facilities associated with LDE and PV/S operations.

LDE includes a variety of cranes; gantry cranes; hoists; mobile cranes; slings; structural slings; sling assemblies; miscellaneous lifting hardware and components; and fork lifts, tugs, and various types of personnel lifts used to support flight hardware ground operations. PV/S includes cryogenic, vacuum, hydraulic, and compressed gases (including air) systems, subsystems, relief valves, gages, flexible hoses, and other components.

Corresponding work processes are described in appendix E-2 as follows.

Activity	Customer	Process Sheet
PV/S	Center	E-2-2
LDE	Center	E-2-3

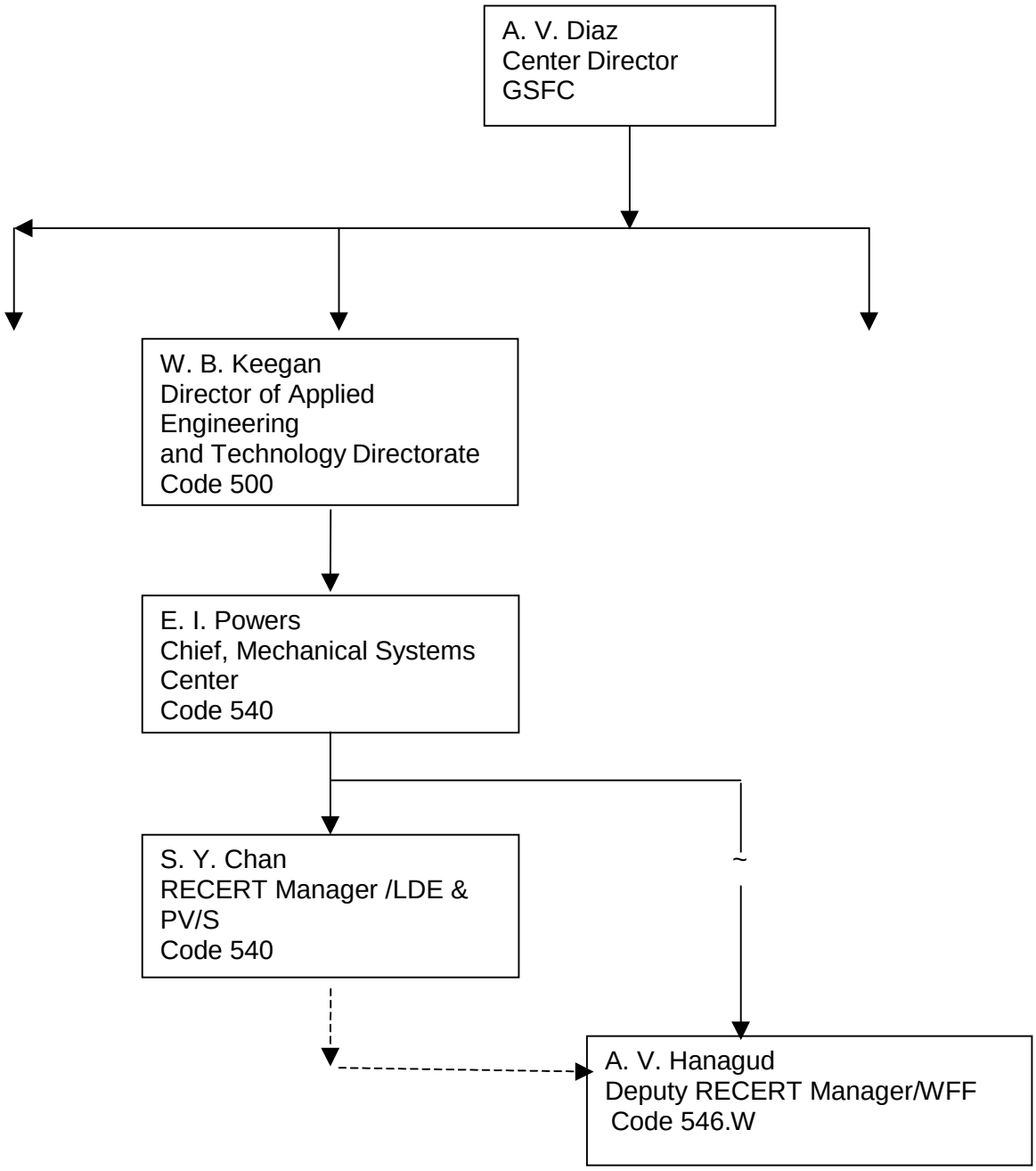
The Program provides all Center organizations at Greenbelt, MD and Wallops Island, VA with test, inspection, certification, and recertification of LDE and PV/S. Consultation on design and installation is also included, as is the certification and recertification of LDE Operators and Critical Lift Coordinators.

Recertification Program metrics are compiled by the RECERT support services contractor and reported to the RECERT Manager on a monthly basis.

RECERT Staffing

The Recertification Program is implemented and managed by the RECERT Manager. The Deputy RECERT Manager/WFF represents the RECERT Manager at the Wallops Flight Facility for day-to-day operations. Daily operations of the Program are supported by a 18-workyear level of effort by an on-site support services contractor.

GSFC RECERT Organization Chart



5.0 Wallops Safety, Code 803

Alignment with NASA Policy and Enterprise Goals

NASA's Strategic Plan — NASA's strategic plan for the next century reorganizes its lines of business and clearly states the Agency's intent to share the benefits and development of technology with science and industry, and the knowledge and experience of space with our Nation's youth.

Goddard Space Flight Center — Goddard is a NASA Center of Excellence for Scientific Excellence and a world leader in the development of unmanned satellites and related technologies. As a Goddard facility, Wallops shares in the Center's vision, goals, and pursuit of excellence.

Wallops Flight Facility — Through the Wallops 2000 Plan, Wallops facilities, personnel and projects support all four of NASA's Enterprises and its crosscutting process of Technology Insertion and Demonstration Support. In addition, we support academic researchers and commercial programs under the Agency's directive to share technology and resources. We enable science by providing sub-orbital and orbital carriers and low cost launch services.

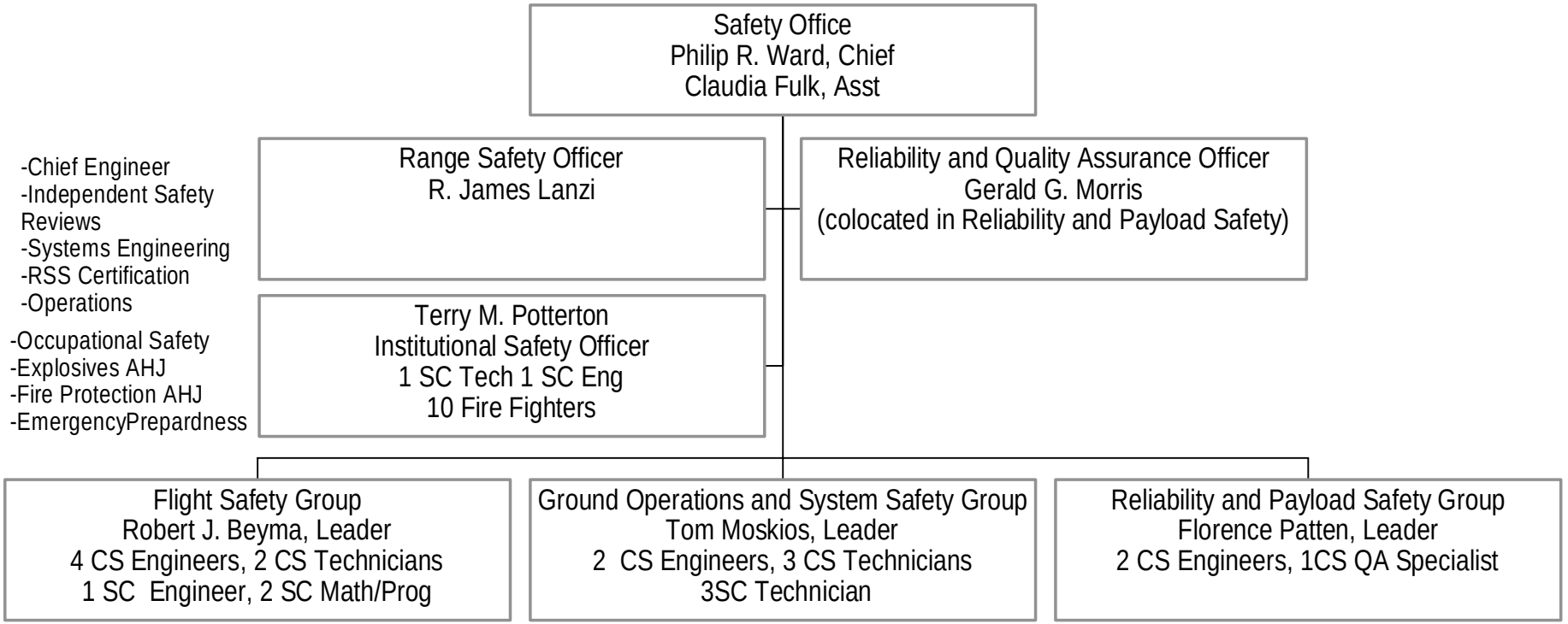
The WFF Safety Office (Code 803)

The WFF Safety Office plans, develops, and provides functional management of policies and procedures for ground and flight safety, mission assurance, reliability and quality assurance. In addition, engineering analysis of ground and flight safety systems, environmental conditions, and operating activities are performed to assure safety reliability and flight worthiness. The Office establishes and approves safety precautions for protection of personnel, property, and the public from hazards generated by ground and flight systems. Provides preflight and post-flight analysis for flight missions. Implements the Wallops Institutional Safety Program and manages the Facility's Fire Department. We also provide payload safety monitoring and reporting for Shuttle Small Payloads Projects. In this capacity, the Safety Office interfaces with the Office of Flight Assurance (Code 300), KSC, and JSC safety organizations.

Provides reliability and quality assurance support for all WFF offices and missions.

Our organization is structured as shown below to support our various functions.

Code 803 Safety Office



The Office Chief establishes safety, reliability and QA policies and technical requirements for the Facility's missions and operations.

The Flight Safety Group (FSG) provides mission risk analyses, develops Flight Safety Plans, and implements operational flight safety. It performs flight hazard analyses, mission feasibility studies, and mission risk analyses. The FSG calculates aircraft, ship, and other flight hazard areas and the flight termination limits for systems with Flight Termination Systems (FTS). It performs trajectory and dispersion analyses and generates data to wind weight vehicles. The FSG generates graphical displays to support real-time safety operations. It develops and maintains computer software to aid in performing analyses. It provides personnel to support operational safety such as wind weighting, surveillance, and provides Flight Safety Officers to monitor vehicle flight and make real-time flight termination decisions. It provides Flight Safety/Range Safety Officer training to NASA, DOD, FAA and commercial customers.

The Ground Operations and System Safety Group (GOSSG) performs gross hazard analyses on orbital and sub-orbital launch vehicles, payloads, unmanned aerial vehicles, missiles, drones, and associated systems (pressure systems, chemical systems, lasers, etc.) which are flown as part of WFF Test Range activities. The purposes of these analyses are to ensure proper design safety principles are employed and to define operational restrictions and danger areas that will protect personnel in the event of a catastrophic system failure. The GOSSG generates Ground Safety Plans, which document the system design and safety features and define the operational danger areas and restrictions. The GOSSG reviews and approves all hazardous operations procedures and provides operational support in a safety oversight capacity. The GOSSG ensures the FTS's are designed and tested to meet range requirements thus assuring reliability and survivability in the event of a launch vehicle malfunction. The GOSSG is responsible for reviewing and approving system design, environmental test procedures, and for performing final certification of FTS's. The GOSSG also provides operational support for missions containing an FTS to assist the Range Safety Officer in certification and operation of the system.

The Institutional Safety Officer (ISO) plans, develops, and implements facility assurance programs and controls for the safety of personnel, protection of property, and reliable operations of facilities. The ISO performs periodic reviews of research facilities, apparatus designs, and operations to ensure compliance with established programs and regulations. WFF's facilities consist of a wide range of fabrication shops, rocket motor storage and processing facilities, materials testing apparatus, tracking and telemetry capabilities, laboratory operations, and launch range operations. Significant efforts are spent in the coordination of the various contractors' safety programs. The ISO provides safety and facility assurance support through the following work processes: Occupational Safety including non-ionizing radiation protection, Explosive Safety, and Emergency Preparedness programs.

The Aviation Safety Officer (ASO) located in the Aircraft Office (Code 830) manages the Aviation Safety Program for GSFC**.** The ASO plans, organizes, and directs the activities required to carry out GSFC's responsibilities for aircraft operations; investigates new areas of aircraft support and plans aircraft capabilities to accommodate them. The ASO provides support to projects using the program support aircraft; develops and implements rules and procedures for aircraft operations and support, provides for safety of operations; technically approves the use and modification of Center aircraft for project support; operates and maintains aircraft; provides range surveillance, aerial recovery and other aircraft support to the Wallops test range; operates program support aircraft on a worldwide basis; operates and maintains mission management aircraft.

The R&QA Officer tailors the GSFC OSMA R&QA Program elements to fulfill the needs of the WFF programs.

The Range Safety Officer (RSO) serves in the capacity of Chief Engineer for the Flight Safety, Ground Operations Safety, and Ground and Flight Systems Safety disciplines. The RSO reviews and approves the technical content of safety plans and safety analysis reports. The RSO performs independent reviews of operations conducted at or managed by WFF to ensure proper identification and mitigation of hazards and to assess the safety of operations across discipline boundaries. The RSO holds the responsibility for certifying and operating elements of the Range safety System used to protect personnel from debris hazards associated with launch vehicle operations.

Safety Office Staffing

The total Safety Office staffing is shown in the table below, as civil service and contractor support to the various offices. The data presents a snapshot of current safety and quality assurance staffing by discipline.

Category	*Total Code 803*		*Flight Safety*		*Ground Op & System*		*Institutional Safety*		*Reliability and Payload*	
	CS	*SSC*	*CS*	*SSC*	*CS*	*SSC*	*CS*	*SSC*	*CS*	*SSC*
Management	1									
Assistant	1									
R & QA Eng	0	0								
R & QA Specialist	1	0							1	
Aerospace Eng	9	2	4	1	2	1	1		2	
Aerospace Eng Tech	5	3	2		3	3				
Programmer/Math	0	2		2						
Safety Eng	0	1						1		
Safety Tech	0	1						1		
Fire Officer	0	3						3		
Fire Fighter	0	6						6		
Fire Inspector	0	1						1		
(Subtotals)	17	19	6	3	5	4	1	12	3	0

Short Fall Analysis

Flight and Ground Safety positions do not have a feeder program to replace staff members who accept other positions or leave government service. Capable personnel will be needed to support the larger, more complex vehicles projected in the Virginia SpaceFlight Center business plans. Due to the specialization of flight and ground safety activities, top college graduates need to spend over a year to become capable, independent, productive staff members. A Co-op or technician retraining program focused on flight and ground safety should be implemented. Sufficient numbers of trainees should be allocated to resource the anticipated attrition.

The current simulations used for proficiency training of Flight Safety Officers lack the desired level of fidelity. Flight Safety Officers are required to make real-time decisions in a high stress environment in order to ensure protection of the public. Likewise, there are numerous other support functions during a launch operation that require similar performance under stress. Many of the necessary decisions must be made in a matter of seconds. High fidelity simulations of the many possible failure modes provide the best possible environment to maintain peak proficiency in these safety critical positions.

The level of resources necessary to acquire this simulation capability is being studied. It is currently estimated that $100K will be necessary for this effort.

The Institutional Safety function gained an additional support service contractor during the last year. Turnover in the position has made it difficult to determine if sufficient staffing exists. This will be evaluated during the next year.

The Fire Department does not have an elevated stream to respond to multi-story buildings and large aircraft. The nearest mutual aid response with an elevated stream is about 30 minutes away. Failure to provide this capability could result in the loss of critical facilities or large aircraft. Additionally, many of the Fire Department's vehicles are approaching an age where they are difficult to maintain in service. The normal expected life of a fire truck is 20 years. A refurbishment will generally net you an additional 5 to 10 years of good service. The WFF emergency fleet consists of:

On the Mainbase

Ambulance 25-1 -1997 CHEVY 4X4 WHEELED COACH TYPE 1 AMBULANCE
Engine 25-3 - 1985 FORD/GRUMMAN ENGINE
Hazmat 25 - 1990 CHEVY 4X4 UNIT AND A 24' FOOT TRAILER
Rescue 25 - 1989 GMC/PIERCE MINI-PUMPER
Tanker 25-7 - 1980 WHITE TRACTOR WITH 7000 GALLON TANKER
Crash 25-10 - 1992 AMERTEK CL 4000 CRASH FIRE VEHICLE (1000 gal)
Crash 25-11 - 1989 AMERTEK CRASH FIRE VEHICLE (1000 gal)
Crash 25-12 - 1989 AMERTEK CRASH FIRE VEHICLE (1000 gal)

On the Island

Ambulance 26-1 - 1997 CHEVY 4X4 WHEELED COACH TYPE 1 AMBULANCE
ENGINE 26-3 - 1977 SEAGRAVE ENGINE. THIS UNIT WAS COMPLETELY REFURBISHED IN 1994
ENGINE 26-4 - 1977 SEAGRAVE ENGINE.

Structural fire protection issues: Engine 26-4 is beyond its service life and should be salvaged. Engines 25-3 and 26-3 may have an additional 4 to 5 years of service. This could be extended if an elevated stream vehicle purchase included pump, hose bed, and tank arrangement commonly called a "quint." This would permit the salvage of 26-4 and reduced usage of the two remaining engines that would prolong their life.

Tanker 25-7 is a low use, special purpose vehicle that should last another 10 years.

Hazamat 25 has 80,000+ miles and will require replacement in the next couple of years.

The remaining problem is in Crash Truck capacity. With all three trucks operational, we are just meeting the NFPA 403 requirements for the NASA aircraft that reside at WFF. The Langley Research Center 757 that frequently utilizes the WFF Airspace exceeds our capability, although work arounds have been implemented using Tanker 25. An additional 1900 gallons of water in a true Crash Truck are required to be in compliance with NFPA 403. Two 1500 gallon Crash Trucks or one 3000 Crash Truck would be required to comply with the standard. A new 1500 gallon truck costs $250,000. A 3000 gallon truck costs $310,000. An alternative is to pick up the trucks being replaced at KSC and rehab them before putting them in service. The KSC estimate for rehab was about $150,000 each.

Due to present budget limitations, certain efforts cannot be performed within our funding guidelines. These are listed below:

Shortfall Area	**Description**	**Required Funding** FY 2000	**Required Funding** FY 2001	**Required Funding** FY 2002
Fire Truck with Elevated Stream	Provide timely fire fighting and rescue capability for support of WFF facilities with 2nd or 3rd floors and large aircraft	$450,000		
Additional CFR Vehicles	Provide additional CFR trucks to support NASA aircraft using WFF	$300,000		
Unfilled Vacancies	Contractual and hardware support to increase the fidelity of Flight Simulation Training for Flight Safety Officers		$100,000	
Feeder Program for Flight & Ground Safety Professionals	The Safety Office currently has five vacancies that impact the support of multiple major or geographically separate missions. May ultimately require outside hire authority to fill.			
	Provide the FTE and Training to re-establish a Co-Op Program to fill projected vacancies	$40,000 2 FTE	$40,000 2 FTE	$40,000 2 FTE

As noted above a significant shortfall exists in areas necessary for the effective implementation of S&MA activities. Funding for these activities will be submitted to the Center during the budget call as an over guidelines request.

Suborbital Projects and Operations

Process Summary

Activity	Customer
Independent Assessment of Program Technical Approach and Implementation	Director of
Range Safety Flight Operations	Director of
Range Safety System Certification and Technology Development	Director of
Range Safety Education and Training	Director of & PPM
Risk Assessment, Mitigation and Standards Compliance	Director of & PPM
System S&MA for the Shuttle Small Payload Project	Director & Shuttle Program
Occupational Safety Program	
Explosive Safety Program	Director
Emergency Preparedness Program	Director
Aviation Safety	Director
Reliability and Quality Assurance Support	Director, Aviation Programs
ISO 9001 Quality Management System	Project Mgr
	Director of

Appendix A - 1

Process Descriptions in Template Format

OSSMA Top Level

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: J. Wonsever

Activity Description: Independent Assessment of Mission Implementation
ISO 9001 ref. Document - GPG-8700.4

The OSSMA is responsible for conducting a continuous independent assessment of the implementation of GSFC missions to enhance the probability of their success. This activity has an informal component, whereby knowledgeable experts keep the OSSMA informed of project status and issues. It also has a more formal component involved with the Systems Review process. The Systems Review Office is responsible for conducting an independent assessment of the status of GSFC missions through a formal review process. This effort begins at the initial phase of project or mission conception, and is conducted as a series of evaluations at specific stages of mission development. The level of activity is tailored to the programmatic needs of each individual mission and is carried out in accordance with the System Safety and Mission Assurance Plan. The scope of this effort varies from the conduct of system level reviews and an assessment of the lower level peer review process, to only providing an assessment of the Principal Investigator's implementation of an independent review process. This effort uses the support of personnel from other technical directorates at the GSFC.

Risk of Not Doing:
Elimination or reduction of the independent assessment would result in a reduced probability of mission success, based on risks associated with design, qualification, and operations. Center Management would be less cognizant of risks, issues, and safety associated with the missions.

Products or Services:	**Metrics:**
Review report Red Book (for non-P.I. mode missions.)	1. Delivery within 30 days. 2. Delivery 3 weeks before launch date 3. Customer survey feedback.
Projects/ Tasks: Systems Concept Review Preliminary Design Review Critical Design Review Mission Operations Review Pre-Environmental Review Pre-Shipment Review Flight Operations Review Launch Readiness Review	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Project Manager Process Owner: J. Kosko, Code 302

Activity Description: Systems Safety Assurance Support

The OSSMA supports GSFC flight projects by implementing system safety programs mandated by NASA, the U.S. Air Force, or internationally controlled launch ranges. The Systems Safety and Reliability Office (SS&RO), assigns a safety expert to each project to assist the launch range in determining the appropriate requirements to impose on the mission and to assist the project manager in understanding and achieving compliance with those requirements. The SS&RO offers various levels of support and service to the project manager based on the programmatic needs of the project. The systems safety program implementation is fully defined in the SS&RO handbook. In all projects, the project manager is ultimately responsible for compliance with system safety requirements. The project manager is not given the option to implement or not implement a safety program; he/she is, however, given latitude on who performs that program.

Risk of Not Doing:
Failure to implement an effective system safety program could prevent the on-time launch or deployment of hardware or software and add significant costs in retrofitting safety compliance.

Products or Services	**Metrics:**
Definition of mission specific system safety requirements Assistance to the Project Manager is implementing system safety programs Documentation of compliance with system safety requirements	See Office Level Process Template
Projects/ Tasks: Displayed in Office Operations Manual	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: J. Garvin, Code 302

Activity Description: Independent Assessment of System Safety

The OSSMA evaluates Mission System Safety Program implementation on all GSFC projects. The Systems Safety and Reliability Office (SS&RO), reviews the efforts of the projects for overall compliance with the Launch Range requirements and other mission safety requirements. The SS&RO issues a memo to the Director of OSSMA confirming that all mission safety requirements have been met. Range acceptance of the safety data package is also required and is a further confirmation of compliance.

Risk of Not Doing:

Failure to provide an independent assessment of the system safety implementation increases the risk that mission safety will not be properly implemented. This could cause accidents, injury or loss of life and or mission objectives.

Products or Services:	**Metrics:**
Continuous assessment of process on system safety. Assessment memo / range acceptance memo	On-time delivery of written assessment (1 week before delivery of Red Book to Center Director)
Projects/ Tasks: Continuous assessment of the mission system safety implementation by project safety manager Overall assessment of the project safety program implementation by the Chief of the System Safety and Reliability Office	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Project Manager Process Owner: Ted Hammer, Code 301

Activity Description: Risk Management Support
ISO 9001 ref. Documents - 300-PG-7120-2.1, 300-PG-7120.2.2,

The OSSMA supports the flight projects in the development and implementation of a risk management program. Risk management begins at the pre-Phase A stage and continues through system deactivation. The Systems Management Office provides a variety of risk management services to the GSFC projects. This comprehensive risk management capability gives the projects the necessary skills needed to develop and implement a formal risk management program.

Risk of Not Doing:

If this activity is not performed, the implementation of risk management programs, as required by NPG 7120.5 on GSFC projects, will be more difficult and less efficient to implement

Products or Services:	**Metrics:**
Provision of Risk Management assistance to GSFC projects. Provision of Risk Management training.	Number of students taught, projects supported, Centers visited, trainers taught.
Projects/ Tasks: Risk identification Risk assessment Resource identification Reliability analyses Risk management plan development Risk mitigation development Risk management tool acquisition and development	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Project Manager Process Owner: Stan Iarosis

Activity Description: Mission Assurance Support
ISO 9001 ref. Document - 303-PG-1060.1.2

This activity provides the planning and implementation of a mission assurance program for the projects. Activity starts at the initial phase of each effort and is documented in the Systems Safety and Mission Assurance Plan. The process is facilitated by providing a single point of contact for project OSSMA activities, called the Systems Assurance Manager (formerly the Flight Assurance Manager). Mission assurance functional support, which this activity provides includes environmental verification, quality assurance, reliability engineering analyses, software management, workmanship audits and on-orbit anomaly reporting. This activity also provides coordination for the systems reviews, anomaly reviews, safety program implementation, and the parts, materials, and processes program.

Risk of Not Doing:

Failure to provide a mission assurance support program to a project would result in a lack of risk determination, assessment, and mitigation, necessary to assure a reliable product.

Products or Services:	**Metrics:**
Mission assurance plans Mission assurance requirements Surveillance of contractor or product Mission assurance expertise and consultation	1. SSMAP approved before Confirmation Review 2. Meet schedule requirements (See lower level process templates for Assurance Management Office)
Projects/ Tasks: Develop SSMAP Develop surveillance plan Reliability analyses Software management Workmanship standards and audits Environmental verification support SAM support	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: J. Maristch

Activity Description: Training and Education

This activity provides the OSSMA workforce and other interested parties with the opportunity to improve their skills in the field of systems safety and mission assurance. This involves activities such as web-based education, training classes, rotational assignments, committee participation, conferences, and other opportunities that fulfill employee development goals.

Risk of Not Doing:

Lack of training results in a shortfall of project support personnel who are skilled in safety and mission assurance technologies.

Products or Services:	**Metrics:**
Training of OSSMA personnel Provision of training courses	Planned vs. actual training efforts (OSSMA goals are based on dedicating 10% of total man-hours on the combination of education, training and outreach)
Projects/ Tasks: Professional development initiative support OSSMA workshops Employee individual development plans	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: Wentworth Denoon

Activity Description: Community Outreach

The objective of this activity is to share information and knowledge obtained from the performance of the OSSMA safety and mission assurance activities with the general public and in particular the GSFC community. A current activity is the use of the OSSMA training center by the Prince Georges Community College for after-hours courses in aerospace workmanship.

Risk of Not Doing:

Information valuable to others will not be communicated, which is one of the key goals of both the NASA Strategic Plan and the GSFC Strategic Implementation Plan.

Products or Services:	**Metrics:**
Community support	Planned vs. actual outreach efforts (OSSMA goals are based on dedicating 10% of total man-hours to the combination of education, training and outreach)
Projects/ Tasks: Mentor elementary, high school, and university students Judge science fairs Provide facilities and expertise in mission assurance activities to non-NASA personnel Speak on technology achievements to educational institutions and the general public Write and publish papers on technology developments in trade magazines and other technical publications	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: D. Cleveland

Activity Description: Management of ISO 9001 Certification Project

Code 300 is responsible for the management of the Goddard Space Flight Center ISO 9001 certification project. This involves establishment and management of a plan that meets the Agency requirement for certification by September 30,1999. Activities include team formation and training, development of system and operational level procedures, and conduct of pre-certification self-auditing.

Risk of Not Doing:
Not utilizing a formal team structure for ISO certification project management would greatly compromise this effort due to the broad scale and depth of effort required, and the relatively short time frame for completion.

Products or Services:	**Metrics:**
Formation and communication of strategies, milestones, and status to participants and customers.	Compliance with team identified schedules.
Successful Center certification to ISO 9001.	Compliance with Agency schedule for certification.

Projects/ Tasks:

Development of Quality Management System structure

Development of system level procedures

Development of directorate work processes

Development of work instructions

Completion of first self-audit

Completion of pre-certification audit

Completion of certification audit

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: C. Vanek

Activity Description: Anomaly Investigation

The OSSMA has developed the capability to perform anomaly investigations of significant problems or failures in GSFC missions. This process is led by senior project and system management expertise assigned to the OSSMA on a rotational basis. This expertise will be drawn from Center projects as they are concluded. Supporting technical expertise will be drawn from GSFC technical directorates and/or other agency, government, or industry sources as needed. This effort will provide a structured, comprehensive approach to the anomaly review process.

Risk of Not Doing:
Failure to capture and analyze data relating to the failures of system hardware and software on NASA missions reduces our ability to learn from past mistakes, and to efficiently improve the designs and test programs of future missions.

Products or Services:	**Metrics:**
Anomaly investigation reports	TBD
Projects/ Tasks: Anomaly investigation Anomaly diagnosis Anomaly resolution analysis	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: NASA Headquarters Codes Q and AE Process Owner: Wentworth Denoon

Activity Description: Policy Development Support

The OSSMA participates in Headquarters initiatives to develop and define Safety and Mission Assurance policy for the Agency. This participation includes attendance at the Quarterly SMA Directors meetings, and at the quarterly Engineering Management Council meetings. Documentation generation and reviews, and participation on special committees. The OSSMA is currently leading an agency-wide effort to supplement the current DCMC services with a more efficient surveillance assurance contract.

Risk of Not Doing:

Lack of participation by the OSSMA would mean that valuable perspectives from a key Earth Science and Space Science Center would be lost.

Products or Services:	**Metrics:**
Participation in SMA quarterly meetings Response to Code Q and Code AE actions	Effective representation at quarterly meetings by Director of or Deputy Director. Provide timely and acceptable responses to action items. Scheduled vs. actual, and % accepted vs. reworked.
Projects/ Tasks: Policy development support Policy implementation support Supplier assurance contract development	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: NASA Headquarters Code Q Process Owner: Charles Vanek

Activity Description: Technology Development

The OSSMA conducts and/or manages several separately funded technology development efforts that are expected to enhance the NASA implementation of safety and mission assurance in the future.

Risk of Not Doing:

The existing expertise at OSSMA would not be applied toward the efforts to improve the Agency S&MA implementation. This would limit NASA in the development of new approaches needed as space systems technology advances.

Products or Services: (potential)	**Metrics:**
NASA workmanship standards Workmanship training courses Goddard environmental verification specification Software Assurance Technologies Risk management course material	Cost and Schedule performance - actuals vs. plan
Projects/ Tasks: Course development in: Fiber optics, Polymerics, Hand Soldering Validation of Test-In-Air models with actual tests Measurement of vibro-acoustic levels imparted to spacecraft from launch vehicle Development of automated methods and tools for early phase system safety analysis Development and provision of risk management course	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: C. Vanek

Activity Description: Support to Center Management Efforts

The OSSMA provides expertise to support Center management efforts. This includes service on the GSFC Program Management Council, the GSFC Quarterly Executive Dialog, and the Quarterly and Monthly Status Reviews. The OSSMA also supports or leads other GSFC management efforts as assigned by Center management.

Risk of Not Doing:

The Center would not take advantage of the experience that OSSMA managers have in the areas of system safety and mission assurance. This would make Center management decisions and judgements more difficult and subject to error.

Products or Services:	**Metrics:**
Attendance at reviews and meetings	Effective representation at reviews and meetings
Special studies and reports as required	Timely and acceptable completion and submission of deliverables, scheduled vs. actual and % accepted vs. reworked
Projects/ Tasks: PMC Reviews QED Reviews Quarterly Status Reviews Monthly Status Reviews Special assignments	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Center Director Process Owner: H. Mitchell

Activity Description: Internal Auditing
ISO 9001 ref. Document - GPG-9980.1

Code 300 is responsible for providing an ISO-compliant internal audit functional capability for the Center. This involves the establishment of three full-time positions to establish and manage this capability. Activities include audit scheduling, audit team qualification and formation, leading audits, documenting and tracking audit results, performing independent corrective action follow-up, and reporting to Center management on audit activities and results.

Risk of Not Doing: Without a concentrated functional capability a timely and effective internal audit process would be compromised and GSFC ISO 9001 certification achievement and/or maintenance would be risked.

Products or Services:	**Metrics:**
Coordination and implementation of internal quality management system audits	Compliance with internal audit schedules Compliance with audit corrective action schedules
Projects/ Tasks: Schedule internal audits Lead/conduct internal audits Track corrective action and perform follow-up activities Internal audit status and trend reporting to Center Management	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: J. Garvin

Activity Description: Non-Conformance Data Bases
ISO ref. document - GPG-1710-1

Code 302 has been assigned the responsibility to be the System Administrator for the center wide Non-Conformance Reporting and Corrective Action System developed to support the center implementation of ISO 9000. The system consists of an internet access database in which is stored all records of non-conformances ranging form items found during ISO audits to items of hardware that have non-conformances, and on orbit anomalies. The office is also operating the Satellite Orbital Anomaly Reporting System and the Space System Engineering Data Base as subsets of the overall non-conformance system.

Risk of Not Doing: Capturing non-conformance data is mandatory under the implementation of ISO 9000. Not having systems to capture, use and report on non-conformance information would impact the Center's effort to become and remain compliant with ISO 9000 requirements and would violate the NASA Agency Director policy of ISO compliance for all NASA activities.

Products or Services:	**Metrics:**
System Administration of Data bases Reports to GSFC management on non-conformance trends, actions, statuses and actions that require resources.	Creation of system within planned schedule Number of reports delivered on time vs. total number delivered
Projects/ Tasks: Run the database system Develop report formats and content meaningful to the management of center resources. Generate reports to GSFC Management	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: Charles Vanek (Acting)

Activity Description: Requirements Management

The Systems Management Office (SMO) is responsible for the development and maintenance of the process whereby the Center missions establish and verify compliance to requirements. The top level performance, technical and programmatic requirements are established by the mission customers and the lower level requirements are derived from these top level requirements as well as other applicable Center, Agency and regulatory requirements.

Risk of Not Doing:

The Centers missions and products requirements would not be well established nor controlled resulting in not meeting Center, Agency or customer expectations.

Products or Services:	**Metrics:**
Documented process for the establishment and management of Requirements	Process documented in Goddard Directives Management System
Reviews of GSFC missions to establish compliance with the Center Requirements Management process	Review of Requirements Management implementation during Systems Reviews
Certification by the Center Director and the Goddard Program Management Council of the successful implementation of the Requirements Management process	Reports to the GPMC and the production of a mission Redbook
Projects/ Tasks:	
Develop process	
Produce Goddard Directives	
Produce reports	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: Charles Vanek (Acting)

Activity Description: Systems Engineering

The Systems Management Office (SMO) is responsible for the development and maintenance of the process whereby the Center implements systems engineering. This covers all aspects of systems engineering including establishment and verification of interfaces, establishment and verification of technical and performance requirements and the establishment of analyses and analyses systems.

Risk of Not Doing:
The Center missions would not have an established minimum process for the implementation of systems engineering resulting in a less than optimum program and project implementation

Products or Services:	**Metrics:**
Documented process for the performance of systems engineering at the GSFC	Process documented in Goddard Directives Management System
Reviews of GSFC missions to establish compliance with the Center systems engineering process	Review of systems engineering implementation during Systems Reviews
Certification by the Center Director and the Goddard Program Management Council of the successful implementation of the systems engineering process	Reports to the GPMC and the production of a mission Redbook
Projects/ Tasks: Develop process Produce Goddard Directives Produce reports	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: Cynthia Fryer

Activity Description: Independent Cost Analyses

Code 301 is responsible for providing authoritative, independent cost and manpower analyses in support of the Center Director and the GPMC. Independent cost analyses is performed for all new start projects and others in the formulation and execution phases. A point of contact/customer is interviewed for the cost element WBS. Technical and programmatic data are collected and analyzed. A cost baseline and assumptions are established. Cost models are exercised and a first cut rough order of magnitude cost is made. The estimate is reconciled with the customer. The estimate is finalized and documented with a memorandum and the independent analyses are provided to the Center Director, the New Business Committee and the GPMC as authoritative predictions of cost, manpower, and resources necessary to ensure mission success.

Risk of Not Doing:

Elimination or reduction of the independent cost and manpower analyses will result in: an increased probability of project cancellation due to cost overruns, a loss of capability for design-to-cost for proposals and near real time cost impact for engineering design changes, and a loss of quick response cost and manpower estimating capability as grass roots cost and manpower estimating require information that is not known early in a study or program.

Products or Services:	**Metrics:**
Independent cost and manpower analyses. Aerospace flight systems cost models and databases. Aerospace ground system cost models and databases. Manpower models and databases. Project schedule profiles and databases. Mission Integration and Test cost models and databases. Systems engineering design-to-cost trades.	Independent cost analysis is completed 1 day prior to the New Business Committee meeting, GPMC meeting, and confirmation reviews. Independent cost analysis completed 5 days prior to Announcement of Opportunity proposal's due date.
Projects/ Tasks: New start projects Studies Proposals Flight project's confirmation reviews New Business Committee	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: Linda Rosenberg, Ph.D

Activity Description: Software Assurance Technology Development

This activity is the investigation and implementation of assurance for software development techniques and products. Activity starts at the initial phase of software development, the requirements document, and continues through the maintenance phase. The objective is the evaluation the products of the software development life cycle phases with respect to quality, safety and reliability. These products include the requirements documents, design, code, test plan with respect to the requirements, and the problem reports. In addition, the SATC will work closely with the liaison from the NASA IV&V Facility to promote IV&V activities as necessary for projects, and create a strong working relationship with the facility. Information learned will be transferred to other NASA facilities and throughout industry through presentations and website.

Risk of Not Doing:

Unknown quality of the final software with respect to the testability, usability, maintainability, verification and validation; insufficient IV&V

Products or Services:	**Metrics:**
Requirement analysis report Code analysis report Requirements verification report Report on reliability based on defect density and projected testing completion Report on research results	Delivery of reports within specified time and with specified budget Deliveries on time for research activities Amount of funding for research Presentations & Publications Web statistics on usage
Projects/ Tasks: Requirement analysis Code analysis including object oriented Test plan linkage to requirements Projected testing completion Reliability estimates Defect density analysis Research on specific topics as funded	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: Linda Rosenberg, Ph.D.

Activity Description: Software Assurance Support to Projects

The objective of this activity to assist projects with an evaluation of the quality, reliability and safety of the software products. Since the SATC has developed the knowledge base and guidelines and purchased the necessary tools, it often is more cost effective for the SATC to support projects in these activities as opposed to projects doing the analysis. As an independent organization, the SATC can easily evaluate products from both contractor and government development.

Risk of Not Doing:

NASA GSFC may accept delivery of software that is of poor quality, and reliability. The software might also be expensive and difficult to maintain.

Products or Services:	**Metrics:**
Requirement analysis reports Code analysis reports Verification and Validation reports Report on reliability based on defect density and projected testing completion	Delivery of reports within specified time and with specified budget Type of activity performed Number of projects supported Funding from projects
Projects/ Tasks: Requirement analysis using ARM Code analysis including object oriented (using McCabe tool) Test plan linkage to requirements Projected testing completion Reliability estimates using SETT Defect density estimates	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director Process Owner: Linda Rosenberg, Ph.D.

Activity Description: Software Safety Assurance
NASA Software Safety Standard NSS 1740.13, 2/96

Safety critical software is defined as software elements used as a part of a system that possesses the potential of directly or indirectly causing harm to humans or damage to property external to the system, could cause or contribute to the system reaching a specific hazardous state, is intended to detect or take corrective action if the system reaches a specific hazardous state, or is intended to mitigate damage if an accident occurs.

Risk of Not Doing:

Software without the proper safeguards, if not performed or is performed incorrectly, inadvertently, or out of sequence could result in a hazard or allow a hazardous condition to exist.

Products or Services:	**Metrics:**
Report on safety critical component identification Evaluation of quality and reliability of Safety Critical components	Delivery of reports within specified time and with specified budget Projects supported Types of activities
Projects/ Tasks: Assistance in the identification of Safety Critical components Code analysis of Safety Critical components Reliability analysis of Safety Critical components	

Appendix A - 2

Process Descriptions in Template Format

Systems Management Office

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director **Process Owner:** J. Wonsever, Code 301

Activity Description: Independent Assessment of Technical Implementation
ISO 9001 ref. Document - GPG-8700.4

The OSSMA is responsible for conducting a continuous independent assessment of the technical implementation of GSFC missions to enhance the probability of their success. This activity has an informal component, whereby knowledgeable experts keep the OSSMA informed of project status and issues. It also has a more formal component involved with the technical design review process. The Systems Review Office is responsible for conducting an independent assessment of the status of GSFC missions through the technical review process. This effort begins at the initial phase of project or mission conception, and is conducted as a series of evaluations at specific stages of mission development. The level of activity is tailored to the programmatic needs of each individual mission and is carried out in accordance with the System Safety and Mission Assurance Plan. The scope of this effort varies from the conduct of system level technical reviews and an assessment of the lower level peer review process, to only providing an assessment of the Principal Investigator's implementation of an independent review process. This effort uses the support of personnel from other technical directorates at the GSFC.

Risk of Not Doing:
Elimination or reduction of the independent assessment would result in a reduced probability of mission success, based on risks associated with design, qualification, and operations. Center Management would be less cognizant of risks, issues, and safety associated with the missions.

Products or Services:	**Metrics:**
Review report Red Book (for non-P.I. mode missions.)	1. Delivery within 30 days. 2. Delivery 3 weeks before launch date 3. Customer survey feedback.
Projects/ Tasks: Preliminary Design Review Critical Design Review Mission Operations Review Pre-Environmental Review Pre-Shipment Review Flight Operations Review Launch Readiness Review	

Appendix A - 3

Process Descriptions in Template Format

Systems Safety and Reliability Office

Office of Systems Safety and Mission Assurance
NASA Goddard Space flight Center
Annual Operating Agreement Plan

Customer: See Below Process Owner: J. Kosko

Activity Description: Systems Safety Assurance Support
ISO 9001 ref. Document - GPG-8700.4

Code 302 supports the GSFC flight projects by implementing the System safety programs mandated by the NASA, U. S. Air Force or Internationally controlled launch ranges. Launch vehicle providers also levy requirements on the flight project, which are included in the implementation of the safety program. Code 302 assigns a safety professional to each project to assist the launch range in selecting the appropriate requirements to impose on the mission and to assist the project manager in understanding and achieving compliance with those requirements. Code 302 offers various levels of support / service to the project manager based on the amount of responsibility that the project manager assigns to the principal investigator. The System Safety Program Implementation is fully defined in the SR&SO handbook for implementing a flight system safety program. In all projects, the project manager is ultimately responsible for the compliance with the requirements. Unlike other elements of the project where risk is taken to minimize cost, no safety risk is acceptable and all means are taken to eliminate or to control risk factors.

Risk of Not Doing:
Failure to implement an effective system safety program will prevent the launch or deployment of the flight hardware.

Goals:	**Metrics:**
Meet negotiated delivery dates No comments requiring changes Negotiated project safety plan by transition to Phase B Safety certification provided by FRR	Number of times SDP deliveries to project miss required dates vs. number of on time deliveries. Date SDP delivered to Range Vs date required. Number of Comments requiring changes vs. number of SDPs not needing changes. Date LSSP delivered to KSC vs. date required. Date SDP provided to Project vs. date required. Date safety certification provided to project vs. LRR date.
Projects/ Tasks:	**Customers:**
Define mission specific system safety requirements and document compliance with them. Perform appropriate hazard failure analysis. Present safety compliance documentation to NASA and DOD safety panels. Coordinate and or chair safety working groups and TIMs.	Project Manager - All Projects Systems Assurance Managers Launch Ranges

Office of Safety and Mission Assurance
NASA Goddard Space flight Center
Annual Operating Agreement Plan

Office: System Reliability and Safety Office Process Owner: J. Remez

Activity Description: Reliability Engineering Support

The SS&RO provides the expertise and capabilities to perform end to end Reliability Engineering Mission analysis in support of GSFC missions. The SS&RO offers various levels of support in analyzing, the technical aspects of the mission. These analyses provide the project manager a thorough understanding of design trades, single point failures, mission operation work arounds, failure modes and effects, and options predict the effects of complete and partial mission success. The implementation of a reliability engineering program, beginning in the mission concept stage, provides an in-depth understanding of what technical risks may challenge the Project and provides the PM with tools to make informed decisions on ways to mitigate, eliminate, or at least control those risks. The Reliability analysis also allows the mission to optimize the design of hardware and mission operations to realize substantial savings by reducing unnecessary redundancy.

Risk of Not Doing:
A thorough reliability analysis enhances the probability of mission success, by addressing design and technical issues that could degrade performance or cause failure. Not performing any reliability analysis may lead to inefficiently designed or over designed hardware.

Goals:	**Metrics:**
Support all projects by providing reliability plans, assessments, predictions, and analyses and recommendations as required.	Number of GSFC in-house projects requesting services vs. number of GSFC in-house projects. Number of design recommendations vs. number of analyses conducted. Number of recommendations accepted vs. number of recommendations.
Projects/ Tasks: Establish Mission Success Criteria Evaluate Mission Operations Scenarios and Work-arounds Perform Reliability Predictions Perform Failure Mode And Effect Analysis Perform Worst Case Analysis Perform Limited Life Analysis Perform Derating Stress Analysis Perform Reliability Trend Analysis Perform Mission Planning Analysis Develop Failure Rate Models Develop Reliability Block Diagrams Develop Reliability Mathematical Models Determine Reliability Drivers Analyze Mission to Record Mission Successes and Failures	**Customers:** All Projects Systems Assurance Managers

Office of Safety and Mission Assurance
NASA Goddard Space flight Center
Annual Operating Agreement Plan

Office: System Safety and Reliability Office Process Owner: J. Garvin

Activity Description: Reliability Risk Assessment

The SS&RO provides the expertise and capabilities to conduct end to end reliability analyses of GSFC missions, offering various levels of support in analyzing, understanding and managing the risks associated with the success of the missions. A thorough implementation of a reliability engineering program, beginning in the mission concept stage, provides an in-depth understanding of what technical and programmatic risks will challenge the Project Manager and provides the PM with tools to manage the risks associated with the mission.

Risk of Not Doing:
Not performing the risk analysis deprives the project manager of all of the technical data needed to make informed decisions relating to design, test and operations to meet the mission objectives.

Metrics:	**Goals:**
Plan provided by end of Phase A activities Preliminary Reliability Risk Assessment by PDR Updated Reliability Risk Assessment by CDR Final Mission Risk Assessment by PSR	To have a risk assessment program plan for each new project, and perform continuous risk assessment throughout the life of the project
Projects/ Tasks:	**Customers:**
Perform a General Project Concept Risk Assessment Establish Mission Success Criteria Evaluate Mission Operations Scenarios and Work-arounds Perform Reliability Trend Analysis Perform Mission Planning Analysis Develop Failure Rate Models Develop Reliability Block Diagrams	All Projects Systems Assurance Managers

Office of Safety and Mission Assurance
NASA Goddard Space flight Center
Annual Operating Agreement Plan

Office: System Safety and Reliability Office Process Owner: S. Milne

Activity Description: Environmental Verification Support

The SS&RO provides consultation to the GSFC missions, offering support in analyzing, understanding and managing the risks associated with implementing both full and partial environmental test programs. Code 302 assists the project in developing the most effective and efficient test program, minimizing cost, schedule, and risk. A thorough review of the mission objectives and environments, beginning in the mission concept stage, provides an in-depth understanding of what technical and programmatic risks will challenge the Project Manager with respect to verification and provides the PM with the detailed knowledge to understand and manage those risks.

Risk of Not Doing:
Tailoring the environmental verification program to the specific needs of the mission allows the project to conserve scarce resources while performing only those tests necessary to enhance the probability of mission success. Not tailoring the program leads to an inefficient and possibly an ineffective test program that may fail to capture mission defects prior to launch.

Metrics:	**Goals:**
Number of times plans, specifications, matrices, and etc. miss need dates vs. number of times submitted on time. Preliminary Program test plan developed by PDR Test Specification and Matrix developed by CDR Test data evaluations performed upon request. Date analysis provided vs. date analysis needed.	Support all project managers by developing a tailored environmental test program for each GSFC mission. Participate in design and failure reviews. Participate in test reviews and data evaluations.
Projects/ Tasks:	**Customers:**
Evaluate Mission Objectives and Environments Assist the Project in Developing a Tailored Test Program to Suit the Needs of the Mission Consult On Evaluation Of Test Results Participate on Failure Review Boards Assist in developing project test specification, matrix and procedures.	All Projects Systems Assurance Managers

Office of Safety and Mission Assurance
NASA Goddard Space flight Center
Annual Operating Agreement Plan

Office: System Safety and Reliability Office Process Owner: T. Hammer

Activity Description: Software Management Assistance

The SS&RO Software Assurance Technology Center has spent the past few years developing metrics and tools to be used in aiding the PM in evaluating the effectiveness of the project software development effort. The SATC is available to assist the PM in implementing a set of metrics to measure the development effort of the flight and ground system software. The SATC is also able to assist the PM in developing and implementing a software management plan and program to manage the expenditure of resources in developing the software. The SATC is available to provide whatever level of support the PM determines is necessary based on the amount of risk that has been determined to be acceptable to the mission.

Risk of Not Doing:
Utilizing the SATC will enhance the PM's control of the software development and test effort. Not utilizing metrics or a controlled development and test environment will lead to inefficiency in utilizing the project resources and may lead to delays in completing the software development effort

Metrics:	**Goals:**
Software management plan completed by PDR. Software safety analysis completed by CDR.	Support all GSFC missions by helping the project develop a tailored software management program including metrics. Perform software safety analysis for all missions.
Projects/ Tasks:	**Customers:**
Assist In Software Management Plan Development and Implementation Assist in Tailoring and Implementing a Metrics Program Perform Software Safety Analysis Perform Software Metrics Research, Development And Implementation Develop Software Standards And Guidebooks Develop Software Assurance Technology Develop Software Reengineering Methods	All Projects Systems Assurance Managers

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
System Safety and Reliability Office
Annual Operating Agreement Plan

Customer: NASA and GSFC Project Management Process Owner: T. Hammer

Activity Description: Risk Management Training

The Office has been tasked with providing training on a NASA wide basis to projects and other personnel on the topic of Risk Management required in NPG 7120.5. The office has developed a training course to present to all NASA managers, and the training is available on an as requested basis.

Risk of Not Doing:
Risk Management is now mandatory for all NASA missions. Not providing the training will impact the mission ability to perform the Risk Management activities

Products or Services:	**Metrics:**
Training and course materials	Courses presented when requested Comments received
Projects/ Tasks: Present training course Revise course and materials as needed Review comments from training sessions and incorporate those that add value to the course	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Systems Reliability and Safety Office
Annual Operating Agreement Plan

Customer: NASA and GSFC Project Managers Process Owner: T. Hammer

Activity Description: Risk Management Support to Projects

Provide support to the projects to assist them in developing and implementing a risk management program.

Assist the Project manager in generating the risk management plan, identifying risks, evaluating risks, determining mitigation strategies, eliminating and or controlling risks and tracking status of the risk management program.

Risk of Not Doing: Risk Management is mandatory for NASA missions. Not performing the Risk Management Support would prevent the Project Manager from implementing an effective risk management program.

Products or Services:	**Metrics:**
Risk Management Plan Technical evaluations of risk Identification of risks Mitigation and control strategies	Support provided to the Project Manager as requested. Support provided in the timeframe requested.
Projects/ Tasks: Assist in identifying risks Assist in developing risk management plan Assist by providing technical analyses Assist in evaluating risks and controls	

Appendix A - 4

Process Descriptions in Template Format

Assurance Management Office

Office of Systems Safety and Mission Assurance
Assurance Management Office
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Center Director, Project Managers & Others as requested

Activity Description: Independent Assessments Process Owner: J. Maristch
ISO 9001 ref. Document - GPG-5100.4

The Assurance Management Office is responsible for developing and conducting independent assessments, evaluating data, and seeking corrective actions to enhance the probability of acceptable products and services. Independent assessments include internal, vendor, and system level audits and surveys on products (hardware and software) and services. Assessments shall be performed pre-award and post-award of a contract and during the life cycle of a product.

Risk of Not Doing:

Risk of accepting poor products and services that may impact mission success.
Risk of cost and schedule of products and services by awarding contracts to ineffective contractors.

Products or Services:	**Metrics:**
Audit/Survey & follow-up reports and corrective actions implemented Database of audits/surveys performed with all criteria included	Schedule vs. timely completion of audits. Number of Non-compliances vs. corrective actions implemented
Projects/ Tasks: Surveys and audits on products and services.	

Office of Systems Safety and Mission Assurance
Assurance Management Office
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Project Manager Process Owner: J. Maristch

Activity Description: Development of Assurance Requirements
ISO 9001 ref. Document - 300-PG-7120.2.1, 300-PG-7120.2.2, 303-PG-5100.1.1

This activity provides the support to a PM in defining tailored SSMA requirements for the project. This activity includes the development of SSMA requirements for purchase orders, RFP's, AO's, and responses to AO's. Support GSFC customer in definition of SSMA req.

Risk of Not Doing:
Lack of tailored SSMA requirements results in an undefined risk mitigation program. This will reduce product reliability and decrease probability of mission success by the acceptance of products or services than do not satisfy mission requirements. This may result in the form of on orbit failures, excessive costs.

Products or Services:	**Metrics:**
Inputs to Risk Management Plan Mission Assurance Requirements Document Assurance section for SOW Section L&M of RFP SSMA section of proposals	SSMA resources usage of people and dollars, (Planned vs. Actual) Approved SSMA req. document (No. of Projects vs. Approved Requirements)
Projects/ Tasks: Supporting to GSFC PM in the tailoring of SSMA requirements.	

Office of Systems Safety and Mission Assurance
Assurance Management Office
NASA Goddard Space Flight Center
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Customer: Project Manager Process Owner: J. Maristch

Activity Description: System Safety and Mission Assurance Planning and Implementation
ISO 9001 ref. Documents - 303-PG-5100.1.2, 303-PG-1060.1.2, 303-PG-5330.1.1, 303-PG-5330.1.2

This activity develops and implements an integrated System Safety and Mission Assurance plan for GSFC products and services. The plan is developed in conjunction with the Project Manager using the Mission Assurance Guidelines (MAG) document for guidance and tailoring.

Risk of Not Doing:
Lack of effective and adequate System Safety and Mission Assurance which would result in poorly planned resources, requirements, and scheduling ultimately affecting mission success.

Products or Services:	**Metrics:**
Surveillance Plan Assurance Management Planning documentation Support Risk Management Planning Surveillance of contractor Government Source Inspection SSMAP	SSMA resources usage planned vs. actual for people and dollars. SAM Monthly Status Reports by project Monthly PBC Metric Chart on support contract performance
Projects/ Tasks: SSMA planning and implementation for GSFC Products and Services	

Office of Systems Safety and Mission Assurance
Assurance Management Office
NASA Goddard Space Flight Center
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Customer: OSSMA Senior Management and Project Managers

Activity Description: AMO Status Reporting Process Owner: S. Iarosis
ISO 9001 ref. Documents - 300-PG-1060.1.1, 303-PG-1060.1.1A

The AMO provides senior OSSMA management written and verbal information on SSMA issues, concerns, and general status related to GSFC products and services.

Risk of Not Doing:
Inappropriate distribution of resources.

Products or Services:	**Metrics:**
Weekly Staff Notes Monthly SAM reviews Code 300 pre-MSR Code 300 Code Q Quarterly SAM inputs to Programmatic Concerns Database Independent reports to Project Management Co-located SAM support to Projects	Unsolicited feedback from OSSMA senior management and Project Management Customer Satisfaction Surveys vs. performance criteria developed by customer
Projects/ Tasks: AMO reporting	

Office of Systems Safety and Mission Assurance
Assurance Management Office
NASA Goddard Space Flight Center
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Customer: Project Managers Process Owner: J. Maristch

Activity Description: Workmanship Standards Program

This process is performed in conjunction with the Jet Propulsion Laboratory and involves the establishment of spaceflight hardware hand-assembly standards, instructional materials, and the provision of classroom training in the following technologies: (a) Hand and Wave Soldering, (b) Cable, Crimp, and Harness Assembly, (c) Polymerics Application, (d) Surface Mount Technology, (e) Optical Fiber Termination and Installation, (f) Electrostatic Discharge Control, (g) Rework, Repair, and Modification of Printed Wiring Assemblies, (h) Introduction to Space Flight Hardware Workmanship Standards.

Risk of Not Doing:
Lack of established workmanship standards and training results in reduced quality and uniformity of space flight hardware assembly techniques, resulting in greater likelihood of hardware failure or performance degradation.

Products or Services:	**Metrics:**
(a) Training Center Operations	(a) Total number of students served vs. scheduled. Cost per student served.
(b) Development and coordination of NASA Assurance Standards	(b) Conduct of Standards Committee meetings, scheduled vs. actual, and timely dissemination of resulting reports, (<> 30days as goal).
(c) GSFC Project Support	(c) Timely communication of changes of standards down to implementing levels (<> 30 days as goal).
Projects/ Tasks:	
Projects/Tasks: (a) Provision of classroom training and proficiency testing for operators, inspectors, and instructors, (b) Review of contractor procedures that implement the standards, (c) Coordination of Standards Committee and industry association meetings, (d) Dissemination of standards and technical information to user communities.	

Appendix A - 5

Process Descriptions in Template Format

Code 300 Office Level

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Code 300 functional and administrative Offices Process Owner: L. Thomas

Activity Description: Information Systems Management

The Information Systems Management group plans, operates, and maintains the Code 300 computer LAN, Code 300 Internet sites, Code 300 databases, and associated hardware and software required for operation. They provide user assistance, perform property administration, and participate in Center Y2000 activities. They also develop and maintain software for Code 300 databases and other specialized applications.

Risk of Not Doing:

Without a central group to administer these functions, Code 300 computer, LAN, and Internet operations would be unorganized and unable to serve customer needs in a continuous manner. Participation in the Center effort to solve the Y2000 problem would likely be ineffective as well.

Products or Services:	**Metrics:**
Code 300 LAN management and operation. Database and software development Y2000 representation	Percentage of LAN operability during working hours. Cost of development and reliability
Projects/ Tasks: Plan and implement LAN development Develop Code 300 databases for LAN Implement Y2000 remedies Provide user help Maintain LAN operation Develop and maintain Code 300 Internet sites	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Code 300 Offices (301, 302, 303, 304) Process Owner: V. Capozzi

Activity Description: Support Contract Administration

The OSSMA supplements its technical workforce through contracted services, primarily through a single provider. Code 300 personnel support the Source Evaluation Board activities during contract recompetition. Once in place, the Code 300 Office administers the contract and ongoing performance by the selected contractor.

Risk of Not Doing:
A single point of contract administration relieves the individual Code 300 Offices from duplicating the efforts required to obtain needed technical support.

Products or Services:	**Metrics:**
Support to the procurement office in the identification of a qualified source of contracted support.	Timely provision of inputs to the SEB process.
Contract administration and oversight.	Provision of contracted support of sufficient quality, quantity, and timeliness to the OSSMA offices - [performance measurement via PBC Metrics]
Projects/ Tasks:	
Support to the procurement office, in the identification of a qualified supplier	
Oversight of performance, determination of award fee	
Administration of financial system for contract performance.	

Office of Systems Safety and Mission Assurance
NASA Goddard Space Flight Center
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Customer: Center Director Process Owner: C. Vanek

Activity Description: Center Representation / Strategic planning

The Code 300 Directorate Office provides representation to the Center in behalf of the OSSMA functional offices. Center-level representation consists primarily of the presentation of project status and issues related to the OSSMA disciplines. This office also coordinates the development and implementation of OSSMA strategies that support Center strategic plans.

Risk of Not Doing: Failure to consolidate Code 300 representation to the Center will require each functional office to represent themselves, at decreased operational efficiency. Coordination of Center-supportive implementation strategies between the offices will be more difficult, and will lose the benefit of a unified approach.

Products or Services:	**Metrics:**
Code 300 Strategic Implementation Plan	On-going progress towards goals identified in OSSMA Strategic Implementation Plan.
Presentation of Independent Assessment of Projects and project issues	Timely, concise presentation of assessments at Center level reviews.

Projects/ Tasks:	
Presentation of Independent Assessment of Projects	
Conveyance of information between the Center Directorate and Code 300 offices	
Development, implementation, and maintenance of strategies in OSSMA Strategic Implementation Plan that support the Center Strategic Implementation Plan	
Participation in project Quarterly reviews.	

Appendix B

Contract Administration and Audit Services

Contract Administration Support Services - DCMC and SAC

GSFC NAS5-# (OR SUB/P.O.)	CONTRACTOR	LOCATION	PROJECT	SAM	CAS	FORECAST FY 99	FORECAST FY 00
S-92569D (NOAA)	PANAMETRICS	WALTHAM, MA	SEM	DANEY	DCMC	520	520
	LMATC	PALO ALTO, CA	GOES	DAFNIS	DCMC	1040	1040
29500	LORAL	PALO ALTO, CA	GOES	DAFNIS	DCMC	10920	4160
29500 SUB SS-922800	ITT	FT. WAYNE, IN	GOES	DAFNIS	DCMC	2080	2080
"	"	"	"	"	SAC	4162	4162
	HUGHES		GOES I-NQ	DAFNIS		693	693
	BALL	BOULDER, CO	ICESAT	KOLECKI	DCMC	500	500
30355	BALL	BOULDER, CO	SBUV-2	DANEY	DCMC	624	624
30384	ITT	FT. WAYNE, IN	NOAA/TIROS	DANEY	DCMC	5200	5200
30350	LMMS	SUNNYVALE, CA	NOAA L/M/N/N'	DANEY	DCMC	6240	6240
30800	SBRC	GOLETA, CA	EOS AM	ROBINSON	DCMC	2650	2650
31481	HERCULES	MOGNA, UT	OLS	KOEHLER	DCMC	624	624
32314	AEROJET ELEC. SYS. DIV.	AZ USA, CA	MSU-A EOS/POES	DANEY	DCMC	6240	6240
32468	UNIV. CORP. FOR ATM. RSCH	BOULDER, CO	EOS/SOLSTICE	TBD	DCMC	208	208
32633	LOCKHEED-MARTIN	VALLEY FORGE, PA	LANDSAT VII	ELLIS	DCMC	1664	0
32799	HUGHES	DANBURY, CT	HST	STICKA	DCMC	600	600
	BALL	BOULDER, CO	COS	STICKA	DCMC	2100	2100

1999 data presented pending FY 2000 Call for support services

Contract Administration Support Services - DCMC and SAC

GSFC NAS5-# (OR SUB/P.O.)	CONTRACTOR	LOCATION	PROJECT	SAM	CAS	FORECAST FY 99	FORECAST FY 00
32900	HUGHES	EL SEGUNDO, CA	TDRS H/I/J	HUBER	SAC	2080	416
32911	LOCKHEED-MARTIN	CAMDEN, NJ	TIROS	DANEY	DCMC	208	208
32921	ITT		AVHRR/HIRS	DANEY	DCMC	416	416
32933	MCDONNELL DOUGLAS	HUNTINGTON BEACH, CA	MELVS	KOEHLER	DCMC	2080	2080
32954	TRW	REDONDO BEACH, CA	EOS PM	ROBINSON	DCMC	8320	8320
50000	LOCKHEED-MARTIN	SUNNYVALE, CA	HST	STICKA	DCMC	3965	3965
97046	UNIV. OF CO.	BOULDER, CO	EOS/HRDLS	PERISON	DCMC	416	416
96020	SOUTHWEST RESEARCH INST.	SAN ANTONIO, TX	IMAGE INSTM'TS	CLAFFY	DCMC	400	150
SwRI-83824 sub to 96020	LMMS	SUNNYVALE, CA	IMAGE/SC	CLAFFY	DCMC	400	150
32940	CTA	ROCKVILLE, MD	SSC	COUNTS	DCMC	10560	10560
32650	SWALES	BELTSVILLE, MD	SSC	COUNTS	DCMC		
32626 PO 859973	LITTON	COLLEGE PARK, MD	ACE INST.	CLAFFY	DCMC		
32600	JACKSON & TULL	BELTSVILLE, MD	SSC	COUNTS	DCMC		
32389	BECHDON	UPPER MARLBORO, MD	SSC	COUNTS	DCMC		
31786	FAIRCHILD/OSC	BELTSVILLE, MD	SSC	COUNTS	DCMC		
32391	F & M	WESTMINSTER, MD	SSC	COUNTS	DCMC		
31227	IDEAS	COLUMBIA, MD	SSC	COUNTS	DCMC		
						FY 99	***FY 00***
TOTAL DCMC HOURS						**67975**	**59051**
TOTAL SAC HOURS						**6242**	**4578**
TOTAL CAAS HOURS						**74217**	**63629**

1999 data presented pending FY 2000 Call for support services

Appendix C

OSSMA Participation by GSFC Project

UPN	GSFC PROJECT CUSTOMERS	NASA ENTERPRISE CUSTOMERS	PROJECT PHASE	MISSION ASSURANCE SERVICES/PRODUCTS FY97	MISSION ASSURANCE RESOURCES/FTE		
				PARTICIPATION	FY00	FY01	FY02
218	**TDRS H,I,J**	**Earth Science**	Design, Fabrication, Test	Requirements development, contract monitoring, Technical evaluations, Non-Conformance & Failure evaluation & resolution. Review of contractor safety documentation, assessment to project manager. Consultation and support for reliability engineering, environmental testing, and software.	2.7	2.6	2.6
225	**EOS AM-1** **Manpower data prepared prior to announcement of launch slip**	**Earth Science**	Design, Fabrication, Test	Requirements development, contract monitoring, Technical evaluations, Non-Conformance & Failure evaluation & resolution. Review of contractor safety documentation, assessment to project manager. Consultation and support for reliability engineering, environmental testing, and software.	0.6	0.6	0.0
226	**EOS PM-1**	**Earth Science**	Design, Fabrication, Test	Requirements development, contract monitoring, Technical evaluations, Non-Conformance & Failure evaluation & resolution. Review of contractor safety documentation, assessment to project manager. Consultation and support for reliability engineering, environmental testing, and software.	5.3	1.9	0.0
227	**EOS ICESAT, GLAS, SOLSTICE**	**Earth Science**	Design, Fabrication, Test	Requirements development, contract monitoring, Technical evaluations, Non-Conformance & Failure evaluation & resolution. Review of contractor safety documentation, assessment to project manager. Consultation and support for reliability engineering, environmental testing, and software.	2.5	1.8	0.7
228	**EOS CSF CHEM**	**Earth Science**	Design, Fabrication, Test	Requirements development, contract monitoring, Technical evaluations, Non-Conformance & Failure evaluation & resolution. Review of contractor safety documentation, assessment to project manager. Consultation and support for reliability engineering, environmental testing, and software.	3.0	3.4	3.5

UPN	GSFC PROJECT CUSTOMERS	NASA ENTERPRISE CUSTOMERS	PROJECT PHASE	MISSION ASSURANCE SERVICES/PRODUCTS FY97	MISSION ASSURANCE RESOURCES/FTE		
				PARTICIPATION	FY00	FY01	FY02
344	**ACCESS / ECCO**	**Space Science**	Design	Requirements definition.	0.7	1.1	3.4
419	**TOMS**	**Earth Science**	EP / FM-3 Operations FM-5 Mfg, & Test	FM-5 Periodic test verification and calibration of the FM-5 instrument. Manufacturing of an interface to an RSDO project as a secondary payload. OSSMA participation as co-chair in project reviews.	0.5	0.3	0.0
428	**EOSDIS/EDOS**	**Earth Science**	Design, Dev, & Test	Consultation and support for reliability engineering, environmental testing, and software.	9.6	9.5	9.5
409	**IDIQ SEB SUPPORT (RAPID S/C dev.)**	**Earth / Space Science**	Contract Evaluation	SEB Participation. Consultation and support for reliability engineering, environmental testing, and software.	1.0	0.1	0.1
615	**POES**	**Earth Science & NOAA**	Operations & dev.	Participation in failure review board for operational satellites. In-plant monitoring and surveillance of production. Review of new designs. Review of contractor safety documentation, launch range presentation, and mission safety certification. Consultation and support for reliability engineering, environmental testing, and software.	9.9	6.0	5.3
616	**GOES**	**Earth Science**	8/9/10 - Operations L/M - Mfg & Test, N & Q - Phase CD	8/9/10 - Participation in ground operations systems. L & M- mfg. & test verification. N & Q - MA support to RFP & review of proposals. Review of contractor safety documentation, launch range presentation, and mission safety certification. Consultation and support for reliability engineering, environmental testing, and software.	12.9	9.4	7.9
882	**HESSI / GALEX**	**Space Science**	Design, Fabrication, Test	Requirements development, contract monitoring. Consultation and support for reliability engineering, environmental testing, and software. System safety engineering support.	0.7	0.8	0.3

UPN	GSFC PROJECT CUSTOMERS	NASA ENTERPRISE CUSTOMERS	PROJECT PHASE	MISSION ASSURANCE SERVICES/PRODUCTS FY97	MISSION ASSURANCE RESOURCES/FTE		
				PARTICIPATION	FY00	FY01	FY02
418	**INT'L Cluster**	**Space Science**	Design	Consultation and support for reliability engineering, environmental testing, and software.	0.4	0.0	0.0
440	**INTERNATIONAL PROJECTS**	**Space Science**	All phases	Varied safety system support, from partial through full safety system development. Consultation and support for reliability engineering, environmental testing, and software.	0.2	0.1	0.0
689	**MIDEX/UNEX**	**Space Science**	n/a	AO support only.	3.1	4.7	4.1
854	**SPARTAN**	**Space Science**	All phases	Full Safety System program implementation, consultation and support for reliability engineering, environmental testing, and software.	0.2	0.2	0.2
264	**HITCHHIKER / GAS**	**Space Science**	All phases	Full Safety System program implementation, consultation and support for reliability engineering, environmental testing, and software.	10.9	10.7	10.7
458	**HST PROJECT**	**Space Science**	Service, Dev.	Full Safety System program implementation, consultation and support for reliability engineering, environmental testing, and software.	15.4	14.1	13.6
465	**INT'L SAC-C Missions**		Service, Dev.	Full Safety System program implementation, consultation and support for reliability engineering, environmental testing, and software.	0.2	0.0	0.0
566	**NOAA/TITAN**	**Earth**	All phases	Safety compliance on launch vehicle service contractors, oversight of payload safety. Consultation and support for reliability engineering, environmental testing, and software.	0.2	0.2	0.2
881	**UNEX**	**Space Science**		Consultation and support for reliability engineering, environmental testing, and software.	0.2	0.3	0.3

UPN	GSFC PROJECT CUSTOMERS	NASA ENTERPRISE CUSTOMERS	PROJECT PHASE	MISSION ASSURANCE SERVICES/PRODUCTS FY97	MISSION ASSURANCE RESOURCES/FTE		
				PARTICIPATION	FY00	FY01	FY02
428	**ESDIS**	**Earth**		Review of requirements verification, test witnessing, FCA/PCA support, assessment of software maturity and reliability, analysis of Configuration Management controls and software processes	9.6	9.5	9.5
860	**IRAC**	**Space Science**	Design, Fabrication, Test	Requirements development, Non-Conformance & Failure evaluation and resolution, process audits, contract monitoring. Consultation and support for reliability engineering, environmental testing, and software.	2.0	0.4	0.0
853	**Contour**	**Space Science**	Design	Requirements development, review plan, Quality Assurance plan, documentation review.	0.5	0.4	0.1
353	**BALLOON PROGRAM**				0.1	0.1	0.0
010	**ISO 9001 IMPL, Training, Center Mgmt.**				7.9	7.9	7.9
049	**TECH EQUIP - MPS**				0.1	0.1	0.1
995	**R&D MULTIPLE SUPPORT**				12.9	12.8	12.9
998	**BID & PROPOSAL**				1.4	2.2	2.2
TOTAL					249.5	218.4	207.4
MANPOWER TOTALS in FULL TIME EQUIVALENTS					**139.8**	**112.5**	**106.8**

Appendix D

Code Q Funded Programs

UPN #	Pgm Mgr	Org.	Task Objective	Funding Requested ($K)		
				FY00	FY01	FY02
323-08-03	**Rosenberg**	302	This is the base funding for the Software Assurance Technology Center (SATC) in support of the research activities at the IV&V Facility, Ames. Basic software metrics research, tool development and technology transfer are part of this activity. (SEL funding is included in this amt)	**600.0**	**550.0**	**380.0**
323-08-07	Rosenberg	302	To research how software reliability can be measured throughout the life cycle as opposed to the testing phase	100.0		
323-29	**Maristch**	**303**	**see descriptions below**	**225.0**	**225.0**	**200.0**
323-29-01	**McGuire**	300.1	The purpose of this effort is to manage NASA's Technical Standards for the manufacture of electronic hardware intended for use in space, in a manner that complies with OMB Circular A-119.	50.0	45.0	70.0
323-29-02	**Park**	730	The goal of this task is to maintain and enhance the LLIS and its web-site to provide NASA engineers (and other authorized users) access to lessons learned (LL) via the World Wide Web (WWW).	75.0	80.0	80.0
323-29-03	**Waterbury**	562	This task supports the NASA Alert Reporting System, enabling administration, maintenance, user support, system requirements identification and coordination, and enhancements as required.	100.0	100.0	50.0
323-72	**Milne**	**302**	To establish risk balancing profiles and failure detection and prevention tools (software) for the development of effective QA programs.	**270.0**	**285.0**	**300.0**
323-78	**Parker**	**541**	The objective of this task is to identify and develop NDE methods for the improved screening of bulk cadmium zinc telluride.	**80.0**	**100.0**	**110.0**
			TOTAL UPN 323	**1,175.0**	**1,160.0**	**990.0**

Appendix E - 1

Process Descriptions in Template Format

GSFC Institutional Safety, Code 205

Safety, Environmental, and Security Office
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Center Director and employees

Activity Description: Occupational Safety Program
Implement a program to provide a safe work environment for all civil servant and contractor employees. The Safety Program is comprised of the following work processes: Program Management, Compliance; Training/Certification; and Safety Assurance. Program Management establishes safety policies and technical requirements for the Center's facilities and operations. It plans, develops, and implements facility assurance programs and controls for the safety of personnel, protection of property and operations. It performs periodic reviews of facilities, apparatus designs and operations to ensure compliance with established programs and regulations. The Compliance process includes OSHA safety audits, construction site surveys, hazard communication and hazardous materials management. The Training/Certification process includes the, safety training, safety meetings, and review of personal protective equipment. The Safety Assurance processes for the institutional safety program includes procurement reviews, responding to inquiries and complaints, mishap investigation, and safety consulting services.

Risk of Not Doing: The risk involved with not performing institutional safety activities is an increased probability of personnel death, serious injury or permanent disability associated with hazardous materials and operations at GSFC/GB. This program ensures a safe and healthful workplace. This activity is required to comply with OSHA regulations.

Products or Services:	**Metrics:**
Safety Awareness Safety Training Safety Consulting Mishap Investigation Worksite Evaluation 29 CFR 1960 Self Assessment	1. Reduction of 10% in the number or OSHA Notices of Violations towards an ultimate goal of zero. 2. Reduction of 10% in the number of civil servant lost time injury cases towards an ultimate goal of zero. 3. Reduction of 10% in the property loss in dollars due to fire or inclement weather towards an ultimate goal of zero. 4. Reduction of 10% in the property loss in dollars due to improper facility design or operation towards an ultimate goal of zero.
Projects/Tasks:	**Projects/Tasks, Cont.**
Safety Web Site Supervisor Safety Training Employee Safety Training Management Oversight Risk Tree Investigation Mishap investigation and reporting Facility and Process inspections	

Safety, Environmental, and Security Office
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Center Director, Employees, NRC, Community

Activity Description: Radiation Protection Program
The Radiation Safety Program consists of training and certification of personnel, approval of uses, review and validation of laboratory/operational procedures, and proper siting of operations. The Goddard Radiation Protection Program is outlined in GHB 1860.1, GHB 1860.2, GHB 1860.3, and GHB 1860.4 covering ionizing, RF, laser, and other types of radiation. The program is designed to ensure the use of all sources of radiation at GSFC or in support of GSFC programs, is performed in a manner which minimizes health and safety risks to users, GSFC employees, and the public in general. The GSFC Radiation Safety Committee (RSC) provides guidance and oversight for the program.

Risk of Not Doing: The failure to have a viable radiation safety program exposes the personnel, mission and the public to an increased risk of health hazards associated with working with and/or around sources of radiation. A comprehensive radiation program ensures GSFC/GB's ability to support Earth and Space Science enterprise initiatives

Products or Services:	**Metrics:**
NRC licensing for sources. Safety and operational reviews Support to the RSC. Advocate in state, national, and international standards and regulative development. Radiological mishap response Radioactive waste management	1. Number and severity of radiological incidents. 2. Regulatory compliance. 3. Employee awareness to radiological issues. 4. Waste reduction.
Projects/Tasks: Tracking of survey results Investigation of incidents Outdoor laser safety issues (SAE G-10T, ANSI 136.6, FAA/NASA) NRC sealed source issues	

Safety, Environmental, and Security Office
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Center Director, Employees, FEMA, Community

Activity Description: Emergency Management Program
Implement a program to promptly and efficiently respond to any emergency that may occur at or near GSFC/GB. The potential emergencies include emergency medical response, fire and explosion, industrial accidents, hazmat events, and hurricanes and other severe weather events. The scope of this activity includes emergency preparedness response planning, emergency preparedness compliance, and assurance. The emergency preparedness response process develops plans to ensure that there is proper command and control of emergencies, emergency response personnel are suitably trained and equipped, plans and procedures are properly exercised, and that NASA resources are properly managed during emergencies. This element forms GSFC/GB's first response to weather, disaster, fire and medical emergencies. The emergency preparedness compliance process includes conducting annual fire drills, emergency preparedness exercises, and recommending corrective actions in all GSFC/GB facilities.

Risk of Not Doing: Being unprepared to respond to emergency will delay the response and may increase the risks/damages to personnel, the environment and the program. Without this program, GSFC/GB would experience an increase in the frequency and severity of emergencies. In some cases, emergencies at GSFC/GB could have deleterious effects on neighboring areas in the community if not responded to promptly. Cascading disasters can also occur within the Facility if the initial phase of an emergency is not responded to promptly and properly. Thus, this program serves to reduce the potential and severity of facility losses in the case of emergencies. This activity is required to comply with OSHA regulations. This program is also required to comply with the Federal Response Plan.

Products or Services:	**Metrics:**
Emergency Response Fire Drills and Emergency Preparedness Exercises Mishap investigation of incidents Consultation services	1. Response Plans for Structural Fire, Hazmat, Emergency Medical Response, and Severe Weather/Hurricanes. 2. Improve response capabilities through use of emergency preparedness software and procedures 3. Develop and implement emergency preparedness exercises that utilize at least 50% of active functional plans and checklists.
Projects/Tasks: Development of Emergency Plans Emergency Medical Response Hazmat control and initial cleanup	**Projects/Tasks (cont):** Fire response Incident command for Disaster response Disaster drills Fire Drills

Safety, Environmental, and Security Office
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Center Director, Facilities Management Division, Project Managers

Activity Description: Facility Systems Safety

The Facility Systems Safety program includes a methodology to review facility changes for new hazards by the Safety and Environmental Branch. Fundamental elements of this activity include: review of facility plans, Facility Acceptance Walk-throughs, and safety support. Facility Plans Review ensures that facility documents such as procedures, safety analysis and critical drawings contain necessary safety processes and requirements. In addition to providing a mechanism for updating certain facility drawings and documents, the program allows proposed facility changes to be properly reviewed prior to implementation to ensure continued safe and reliable operations. Facility Acceptance Walk-throughs assure that facility operations are being conducted in accordance with approved standard operating procedures, and that the current procedures agree with the requirements of safety analysis abatements. The Safety and Environmental Branch supports the design, construction, modification and repair of high risk facilities and equipment. This work process prepares baseline safety analysis and standard operating procedures for these facilities and subsequent changes and assures design and facility compliance with established safety programs and regulations. The safety support process allows customers technical expertise during all aspects of facility lifecycles. This provides the resources to ensure that projects include safety requirements in planning, design and construction of facilities.

Risk of Not Doing:
The risk involved with not performing Facility Systems Safety activities is an increased probability of personnel death, serious injury and facility equipment damage.

Products or Services:	**Metrics:**
Plan review site inspection safety consultation	1. Property losses ($) due to improper facility design or operations. 2. Modifications to correct code violations ($) due to improper facility design or operations. 3. Injuries (lost man-hours) due to improper facility design or operations.
Projects/ Tasks: On-going review of drawings as submitted from Code 220. Participation in Facilities Acceptance Walk-throughs as scheduled. Participation in Pre-Construction meetings. Consultation with Planners, Design Engineers, and Customers as requested.	

Safety, Environmental, and Security Office
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Center Director and Employees

Activity Description: Chemical Safety Program

The Chemical Safety Program consists of training and certification of personnel, review and validation of laboratory/operational procedures, and proper siting of operations. The Goddard Chemical Hygiene Plan (GHB 1790.1A) is reviewed annually and updated, as needed. Upon requests, technical assistance to comply with the Chemical Hygiene Plan, as well as assistance with developing safety precautions for new projects and procedures, is provided. Time is spent on research to keep current on developing regulations and legal requirements regarding chemicals used in GSFC facilities.

Risk of Not Doing: The failure to have a viable chemical safety program exposes the personnel, mission and the public to an increased risk of health hazards associated with working with and/or around hazardous materials.

Products or Services:	**Metrics:**
Participation in the CSSC Laboratory Surveys Development of the database of CSSC Survey results (point of contact for each Code, chemicals used in each laboratory, etc.)	1. Reduction in chemical incidents. 2. Decrease in chemical related code violations. 3. Increased employee awareness to chemical issues.
Projects/Tasks: Tracking of survey results Chemical inventory database Mishap investigation of chemical incidents	**Projects/Tasks, Cont.**

Safety, Environmental, and Security Office
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Center Director and Employees

Activity Description: Fire Protection Program
This program consists of Fire Protection Compliance and Assurance. The Fire Protection Compliance process includes audits, plan review, assessing compliance with the National Fire Protection Association Standards, and recommending corrective actions in all GSFC/GB facilities. The Assurance processes maintain all fire extinguishing systems, provide response to inquiries and complaints, investigate mishaps, and review of procurement packages for compliance with fire standards.

Risk of Not Doing:
The risk involved with not performing Fire Protection activities is an increased probability of personnel death, serious injury or permanent disability, and property loss associated with hazardous operations at GSFC/GB. Without this program, GSFC/GB would experience an increase in the frequency and severity of fires. Cascading disasters can also occur within the Center if incipient fires are not responded to promptly. Thus, this program serves to reduce the potential and severity of facility losses in the case of fire. This activity is required to comply with OSHA regulations.

Products or Services:	**Metrics:**
Review of plans and procedures with regard to fire protection issues. Mishap investigation of fire related incidents. Fire prevention activities. Consultation services with regard to fire protection.	1. Reduction of fire related incidents. 2. Decrease in fire related code violations. 3. Increased employee awareness to fire issues.
Projects/ Tasks: Fire protection maintenance issues in RCM program. Prepare for and implement activities for Fire Prevention Week.	

Safety, Environmental, and Security Office
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Center Director and Employees

Activity Description: Occupational Health Program

The Occupational Health program implements a wide range of occupational and industrial Hygiene services including radiological health, sanitation, occupational medicine, physical fitness, employee assistance, workers compensation, nutrition, wellness, and health education.

Risk of Not Doing:
The risk involved with not performing the Occupational Health activity is an increased probability of personnel injury or illness associated with hazardous materials and operations at GSFC/GB. This program ensures a safe and healthful workplace. This activity is required to comply with OSHA regulations.

Products or Services:	**Metrics:**
Medical surveillance Review of plans and procedures with regard to health and industrial hygiene issues. Consultation services with regard to health and industrial hygiene. Employee physicals Fitness Facility Employee Assistance program	1. Increased employee awareness to health issues. 2. Use of EAP services. 3. Use of Fitness facility. 4. Decrease in illness and injuries.
Projects/ Tasks: Wellness program Fitness newsletter Health newsletter	

Appendix E - 2

Process Descriptions in Template Format

GSFC Mechanical Systems Center, Code 540

AETD Mechanical Systems Center: Recertification Program (RECERT)
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director

Activity Description: Certification and Recertification of Ground-Based Pressure Vessels and Pressurized Systems.

The RECERT Program provides Center organizations at Greenbelt, MD and Wallops Island, VA with test, inspection, certification and recertification, as well as consultation on design and installation of ground-based pressure vessels and pressurized systems (PV/S). The Program is mandated by NASA Policy Directive NPD 8710.5 and Federal OSHA requirements in 29 CFR 1960.

Risk of Not Doing: Ground-based PV/S certification and recertification is mandatory for all NASA Centers. In addition to a potential violation of Federal law and NASA requirements, the risk of personnel injury or fatality, and/or damage or destruction to GSFC equipment and facilities could be the result of not implementing the RECERT Program.

Products or Services:	**Metrics:**
PV/S inservice inspections, certification and recertification. Ground-based PV/S design, fabrication, installation, and testing consultations. PV/S code compliance reviews.	Perform and document inservice inspections as required by Center Policy. Document number of deficiencies, incidents, or mishaps related to PV/S.
Projects/ Tasks: Perform PV/S inservice inspections. Certify PV/S. Recertify PV/S periodically. Perform PV/S Configuration Management. Perform PV/S design reviews. Perform PV/S code compliance reviews.	

AETD Mechanical Systems Center: Recertification Program (RECERT)
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: GSFC Center Director

Activity Description: Certification and Recertification of Lifting Devices and Equipment.

The GSFC RECERT Program provides Center organizations at Greenbelt, MD and Wallops Island, VA with test, inspection, certification and recertification, as well as consultation on design specification and installation of Lifting Devices and Equipment (LDE). Training, certification, and recertification of LDE operators is also provided. The Program is mandated by NASA Safety Standard for Lifting Devices and Equipment, NSS/GO-1740.9 and Federal OSHA requirements in 29 CFR 1910.179.

Risk of Not Doing: Compliance with the safety standards delineated in NSS/GO-1740.9, including LDE operator training and certification/recertification, is mandatory for all NASA Centers. In addition to a potential violation of Federal law and NASA requirements, the risk of personnel injury or fatality, damage to or destruction of GSFC equipment and facilities, and/or a lack of readiness of LDE to support Flight Projects could be the result of not implementing the RECERT Program.

Products or Services:	**Metrics:**
LDE inspections, certification and recertification. LDE specification and testing consultations. LDE code compliance reviews. LDE operator training, certification, and recertification.	Perform and document inspections as required by Center Policy. Document number of deficiencies, incidents, or mishaps related to LDE. Conduct operator certification and recertification training courses as required by Center Policy.
Projects/ Tasks: Perform LDE inspections. Certify LDE. Recertify LDE periodically. Perform LDE Configuration Management. Perform LDE specification reviews. Perform LDE code compliance reviews. Perform LDE operator training, certification, and recertification.	

Appendix E - 3

Process Descriptions in Template Format

Wallops Launch Range, Code 803

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Director of Suborbital Projects and Operations

Activity Description: Independent Safety Assessment of Program/Project Technical Approach and Implementation

The Safety Office evaluates the technical approach and implementation of GSFC/WFF missions at all phases of development to ensure that the flight and ground apparatus are designed according to accepted standards and regulations for hazardous systems. Operations and hazardous procedures are reviewed to ensure that the exposure of personnel and property to hazards is minimized and is kept within accepted levels. The Safety Office certifies the flight-worthiness of safety critical vehicle systems and subsystems, and the operational safety of ground systems and procedures. Safety Office personnel participate in failure and anomaly investigation activity to ensure that the impact of specific anomalies on other projects is understood, and that appropriate corrective actions are implemented.

Risk of Not Doing:

Systems may be designed and manufactured without appropriate levels of safety engineering support/review thus personnel may be exposed to unnecessary hazards. Operational planning may not be sufficient to protect the public, mission personnel, or property from the risk associated with performing launch operations. Design and hardware modifications may be required late in the project life cycle resulting in higher costs and schedule delays.

Products or Services:	**Metrics:**
Hardware Certification Memorandum Procedure Certification Memorandum Safety Review Panel Support Failure and Anomaly Investigation Support	Safety related schedule delays. Timely completion of hardware and procedure review for certification.
Projects/Tasks: Design Review Procedure Review RSO Independent Safety Review	

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Director of Suborbital Projects and Operations

Activity Description: Range Safety Flight Operations

The RSO supports GSFC/WFF projects during operations at the WFF Test Range or remote operations. The RSO assures the implementation of the ground and flight safety program during flight operations. The RSO reviews all conditions subject to safety plan limits and is given the authority to establish a HOLD on operations when necessary, until safety requirements are met. The RSO may exercise command destruct authority over the vehicle as necessary in flight. The RSO determines and authorizes appropriate safety procedures to be followed during unplanned operational contingencies.

Risk of Not Doing:

There will be no assurance that the risk to mission participants and the general public is within acceptable limits as defined in management approved safety documentation.

Products or Services:	**Metrics:**
Public Safety Assurance	Unplanned safety issues experienced during operations. Response to planned and unplanned contingencies.
Projects/Tasks: Real-time operations management Safety oversight of hazardous operations	

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Director of Suborbital Projects and Operations

Activity Description: Range Safety System Certification and Technology Development

The RSO certifies the operation and maintenance of the WFF Range Safety System that is comprised of a range safety display system, range surveillance ground based and airborne radar systems, radar, optical, and telemetry tracking and display systems, and command control systems used for Flight Termination.
The Safety Office continually updates and expands the tools used to support the safety needs of GSFC/WFF projects. The RSO holds the responsibility for determining future technical requirements of GSFC/WFF customers, and identifying the state of the art technologies required supporting these requirements.

Risk of Not Doing:

No coordinated effort will be in place for the certification of range safety systems and subsystems. There will be an increased likelihood of substandard or faulty systems being used in safety critical ground and flight operations.
The Range will not be able to maintain the Range Safety Systems currently in use due to component technological obsolescence. The Range will not be able to support incoming projects, which require more technologically sophisticated hardware and software to execute the range safety function.

Products or Services:	**Metrics:**
Hardware Certification Memorandum Procedure Certification Memorandum Range Safety Systems Requirements Documents Range Safety Systems Development Plans	Progress toward a formalized certification protocol for range surveillance assets. Milestone progress in development efforts.
Projects/Tasks: Operational prelaunch testing Failure modes simulations/testing Operational readiness reviews Systems Engineering and Engineering Design of Range Safety Systems: Range Safety Simulation Training Facility RADAC Filter Redesign Wind Weighting System Upgrade Range Safety Computing Facility Upgrade	

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Director of Suborbital Projects and Operations

Activity Description: Range Safety Education and Training

The Safety Office is responsible for developing education programs and plans to ensure that the Safety Office staff is properly trained. This effort includes development of Range/Flight Safety Officer training, Ground Safety training (in-progress), and training in safety and risk analysis techniques. The Safety Office is also responsible for developing training materials for mission and project personnel to educate them in the methods employed at WFF to control launch range hazards.

Risk of Not Doing:

Safety Office personnel will not be properly trained to perform their required duties. Range users will not understand the methods used at WFF to control hazards and thus may unknowingly violate safety rules and regulations.

Products or Services:	**Metrics:**
Flight Safety/RSO Training Course Ground Safety Course (in-work)	Progress toward the development of a formal Range Entry Briefing.
Projects/Tasks: Range Safety Officer Training Manual Ground Safety Training Manual Range Entry Briefing	

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Director, Director of Suborbital Projects and Operations, Project Managers

Activity Description: Risk Assessment, Mitigation, and Standards Compliance

The Safety Office provides risk management services to GSFC/WFF projects and facilities. Specialized analytical techniques are used to identify hazards associated WFF operations, assess the risk, and develop plans to mitigate the risk. The Safety Office assists GSFC/WFF Management in understanding the residual risks associated with mission activities. Facility engineers and operations managers are assisted in understanding and achieving compliance with pertinent safety instructions, handbooks, and regulations that govern facilities management and activities. Plans are developed to ensure facilities are built and operated in compliance with safety policies and criteria.

Flight and Ground Safety professionals support project managers and project engineers in understanding and achieving compliance with pertinent instructions, analysis techniques, handbooks, and regulations. The results of these activities are documented in Safety Analysis Reports, Ground Safety Plans, and Flight Safety Plans, which document the hazards, the risk and mitigation controls to be employed during an operation.

The Safety Office offers expertise in system reliability analysis for flight safety critical systems.

Risk of Not Doing:

Projects may be proposed or conducted in a manner that exposes personnel and the public to unnecessary risks or at risk levels that exceed generally accepted levels.

Systems may be designed and manufactured with unacceptable risks or failure modes. Design and hardware modifications required late in the project life cycle would result in higher costs and schedule slips.

Construction and/or siting of facilities may not comply with recognized safety standards or contribute to the overall risk of the mission.

Products or Services:	**Metrics:**
Feasibility Studies Range Safety Policy Development RSO Independent Safety Review Ground Safety Plans Flight Safety Plans Hardware Certification Memorandum Procedure Certification Memorandum	Number of Flight Safety Plans vs. number required. Number of Ground Safety Plans vs. number required.
Projects/Tasks:	**Projects/Tasks, cont.:**
Safety Analysis Reports Hazard and Risk Analyses Reliability analysis System Safety Hazard Analyses Flight Profile Risk Analyses	Risk mitigation development Facility Safety Engineering/Review Support Explosive Quantity/Distance Analyses Radio Frequency Hazard Analyses Laser Hazards Analyses

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Director; Director of Suborbital Projects and Operations; Mission Managers; Small Shuttle Payload Experimenters; Astronauts/Human Exploration of Space Programs

Activity Description: System Safety and Mission Assurance for the Shuttle Small Payload Project (SSPP). The Safety Office provides safety and quality assurance support to experimenters during experiment design, hazard analyses, and flight safety package preparation; performs safety assessment of experiment design; and facilitates the safety review process with Code 300, JSC and KSC for payloads such as Get Away Specials (GAS) and Space Experiment Modules (SEM). Experiments are approved under strict selection criteria enforcing the principle of hazard containment within the GAS Canister hardware. To this end, the Safety Office ensures that all experiments are either inherently benign, or controlled by appropriate hazard containment measures meeting established safety criteria. In addition, all experiment hardware is inspected for conformance with the previously approved design and safety criteria prior to integration, and inspected for anomalies during the post flight de-integration process. All hardware must undergo initial qualification, and is identified and tracked for re-flight. SEM provides a no-cost educational opportunity for student in grades Kindergarten through the University, and GAS is a low cost research option for academia, and governmental and commercial enterprises.

Risk of Not Doing: : Research and educational opportunities may be lost due to lack of required safety assurance for manned space flight activities, or personnel and critical facilities and hardware, including the shuttle, could be exposed to significantly higher levels of risk.

Products or Services:	**Metrics:**
Customer Safety, Reliability & QA Consultation Hazard Analyses Safety Data Packages Safety & Mission Assurance Safety Review Process Facilitation Operational Safety, Reliability & QA Support	Number of experiments/modules flown on shuttle. Number of anomalies found in post flight inspection.
Projects/Tasks:	**Projects/Tasks, Cont.**
Safety Data Reviews & Assessment Hazard Reports Flight Safety Data Package (Phase III Reviews w/KSC & JSC)) Experiment Safety Checklists Carrier Hardware Verification Tracking Log Quality Assurance	

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
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Customer: All WFF Managers/Employees, Goddard Sr. Management

Activity Description: Implement a comprehensive **Occupational Safety Program** to provide a safe work environment for all civil servant and contractor employees. The Safety Program is comprised of the following work processes: Program Management, Compliance; Training/Certification; and Safety Assurance. Program Management establishes safety policies and technical requirements for the Center's facilities and operations. It plans, develops, and implements facility assurance programs and controls for the safety of personnel, protection of property and operations. It performs periodic reviews of facilities, apparatus designs, and operations to ensure compliance with established programs and regulations. The compliance process includes OSHA safety audits, industrial hygiene support, construction site surveys, hazard communication and hazardous materials management. The Training/Certification process includes the safety training, safety meetings, and review of personal protective equipment. The Safety Assurance processes for the institutional safety program includes procurement reviews, responding to inquiries and complaints, mishap investigation, and safety consulting services.

Risk of Not Doing: The risk involved with not performing institutional safety activities is an increased probability of personnel death, serious injury, or permanent disability associated with hazardous materials and operations at WFF. This program ensures a safe and healthful workplace. This activity is required to comply with OSHA regulations. The current staffing is insufficient to provide full services to the managers and employees of WFF

Products or Services:	**Metrics:**
Safety Awareness Safety Training Safety Consulting Mishap Investigation Worksite Evaluation 29 CFR 1960 Self Assessment	1. Number of OSHA Notices of Violations versus goal of zero. 2. Number of civil servant lost time injury cases versus goal of zero. 3. Property loss in dollars due to fire or inclement weather versus goal of zero. 4. Property loss in dollars due to improper facility design or operation versus goal of zero.
Projects/Tasks:	**Projects/Tasks, Cont.**
Safety Web Site Safety E-Mail Campaign Job Hazard Analysis Supervisor Safety Training Employee Safety Training Risk Management Training	Management Oversight Risk Tree Investigations Wallops Contractor Safety Committee Mishap investigation and reporting Facility and Process inspections

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
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Customer: WFF Senior Management and Projects using Explosives

Activity Description: The **Explosive Safety Program** consists of training and certification of personnel, validated operational procedures, and proper siting of operations.

Risk of Not Doing: The failure to have a viable explosive safety program exposes the personnel, the mission and the public to risks associated with unintentional fire and explosion. Explosive safety is also a NASA Supplemental OSHA Standard.

Products or Services:	**Metrics:**
Pryo handler training and certification Explosive operating procedures Ground Safety Plans Quantity Distance Siting Emergency Response Planning	All Pryo handlers are certified. All new, revised or inactive explosive procedures are reviewed by safety prior to use. Site Plan is current. Emergency Response Plan is approved by the AHJ.
Projects/Tasks: Revised Pryo Handler Course Evaluate Operating Procedures for 1. Operational limits 2. Personnel limits 3. Safety Precautions Develop Site Plan with Explosive QD Arcs Finalize emergency response plans	**Projects/Tasks, Cont.**

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
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Customer: All WFF Managers/Employees, Goddard Sr. Management, The Community

Activity Description: Implement comprehensive **Emergency Preparedness Program** to promptly and efficiently respond to any emergency that may occur in the WFF vicinity. The potential emergencies include emergency medical response, fire and explosion, accidents involving rockets or airplanes, industrial accidents, hazmat events, and hurricanes and other severe weather events. The scope of this activity includes emergency preparedness response planning, emergency preparedness compliance, and assurance. The emergency preparedness response process develops plans to ensure proper command and control of the emergencies, training of emergency response personnel, suitable equipment for responders, exercise of the plans and directs the work of fire and emergency service personnel. This element forms WFF's first response to weather, disaster, fire, and medical emergencies. The emergency preparedness compliance process includes conducting annual fire drills, emergency preparedness exercises, assessing compliance with the National Fire Protection Association Standards, and recommending corrective actions in all WFF facilities. The Assurance processes maintain all fire extinguishing systems, provide response to inquiries and complaints, and reviews of facility design packages for compliance with fire standards.

Risk of Not Doing: Being unprepared to respond to emergency will delay the response and may increase the risks/damages to personnel, the environment, and the program. Without this program, WFF would experience an increase in the frequency and severity of fires. In some cases, emergencies at WFF could have deleterious effects on neighboring areas in the community if not responded to promptly. Cascading disasters can also occur within the Facility if the initial phase of an emergency is not responded to promptly and properly. Thus, this program serves to reduce the potential and severity of facility losses in the case of fires or other emergencies. This activity is required to comply with OSHA regulations.

Products or Services:	**Metrics:**
Emergency Response Fire Drills and Emergency Preparedness Exercises NFPA Compliance Assessment Fire Suppression System Assurance	Response Plans for Structural Fire, Aircraft Mishap, Land impact of Rockets, Hazmat, Emergency Medical Response, and Severe Weather/Hurricanes. Notification to Sr. Management when response capability is reduced by more than 33% Training exercises or actual events for at least 50% of the plans. Fire Protection review of all major construction packages. Fire Prevention inspections of all significant buildings (annually). Test Fire Suppression systems IAW NFPA.
Projects/Tasks:	**Projects/Tasks, Cont.**
Development of Emergency Plans Emergency Medical Response Hazmat control and initial cleanup Fire response Aircraft Emergency response Incident command for Disasters Disaster drills	Fire Drills Fire Prevention Inspection Fire Protection review of construction packages Fire Suppression system Testing (includes code 228) Fire prevention awareness and training

Aviation Safety Officer
Wallops Flight Facility
NASA Goddard Space Flight Center
Annual Operating Agreement Plan

Customer: Director, Director of & Aviation Project Managers

Activity Description: Implement the GSFC Aviation Safety Program. The Aviation Safety Officer (ASO) provides aviation safety oversight and assistance to line management and coordinates aviation safety matters with interfacing organizations. The ASO is a member of the Airworthiness Review Board, Flight Readiness Review Board, and the Flight Standardization Board. The ASO, as an active pilot, provides QAE for aviation safety.

Risk of Not Doing: The failure to have a viable aviation safety program exposes the personnel, the mission and the public to risks associated with aviation accidents.

Products or Services:
Airworthy aircraft

Qualified flight crew

Approved operational procedures

Aviation Safety Meeting

Metrics:
Number of Class A & B Mishap vs. a goal of zero.

Projects/Tasks:
Safe Planes
1. Is this the right aircraft for this mission?
2. Maintenance program
3. Modification program

Safe People
1. Pilots
2. Aircrew & Mechanics
3. Aircraft Operations Management
4. List all personnel on the aircraft during flight operations

Safe Procedures
1. Detailed flight plan
2. Hazard controls
3. Mission reviews
4. Management's approval

Projects/Tasks, Cont.

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
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Customer: Project Managers

Activity Description: Reliability and Quality Assurance (R&QA) Support

This activity provides the monitoring and review of a mission assurance program for the projects. Activity starts at the initial phase of each effort and is documented in the WFF R&QA Manual. The process is facilitated by providing a single point of contact for project R&QA activities, called the Reliability and Quality Assurance Officer (R&QAO). Mission assurance functional support, which this activity provides, includes review and sign off of vehicle assembly procedures, review of vehicle assembly activities, review of payload assembly activities, review of payload environmental testing activities, and workmanship audits. This activity also provides oversight of the Design and Mission Readiness Review presentations, and review of flight anomaly reports.

Risk of Not Doing:
Failure to provide a mission assurance support program to a project would result in a lack of risk determination, assessment, and mitigation, necessary to assure a reliable product.

Products or Services:	**Metrics:**
Review of vehicle and payload assembly procedures Review of vehicle and payload assembly and checkout activities Oversight of Instrument Calibration Recall Program Membership of Anomaly Report Review Committee Tracking of applicable GIDEP Alerts	Meet schedule requirements.
Projects/Tasks: Workmanship standards and audits Environmental verification support Review of flight anomaly reports Review of GIDEP Alerts R&QA support	**Projects/Tasks, Cont.**

Safety Office
Wallops Flight Facility
NASA Goddard Space Flight Center
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Customer: Director of Suborbital Projects and Operations

Activity Description: Support to the establishment of the ISO 9001 Quality Management System.

The Directorate is providing support to the working groups for the planning and development of ISO 9001 documentation for Center certification to ISO 9001 by April of 1999. This project is in compliance to NMI 1270.3, which requires that all NASA centers be third party certified to one of the ISO 9000 standards.

Risk of Not Doing: The risk of missed opportunities for improvement of GSFC quality management system procedures will increase if ISO 9000 certification is not pursued. The mandate of NMI 1270.3 will not be met.

Products or Services:	**Metrics:** Scheduled plan vs. actual results
Member of the Quality Management System Council	

Projects/Tasks:	**Projects/Tasks, Cont.**
Development of Quality Management System structure Development of system level procedures Development of directorate work processes Development of work instructions Completion of first self-audit Completion of pre-certification audit Completion of certification audit	